

In This Issue—Autogenous Welding

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# MOTOR AGE

Volume XXXVIII  
Number 4

PUBLISHED WEEKLY AT THE MALLERS BUILDING  
CHICAGO, JULY 22, 1920

Thirty-five Cents a Copy  
Five Dollars a Year



## Champion Dependable Spark Plugs

### You Have Never Tried This of Course

**B**UT if you will give a Champion No. 3450 Insulator this test you will find that the Insulator can be successfully driven into a solid bar of lead without cracking or injuring the Insulator in the slightest.

Our No. 3450 Insulator has been perfected until it will stand up under abnormal conditions — conditions far more severe than those encountered in ordinary usage.

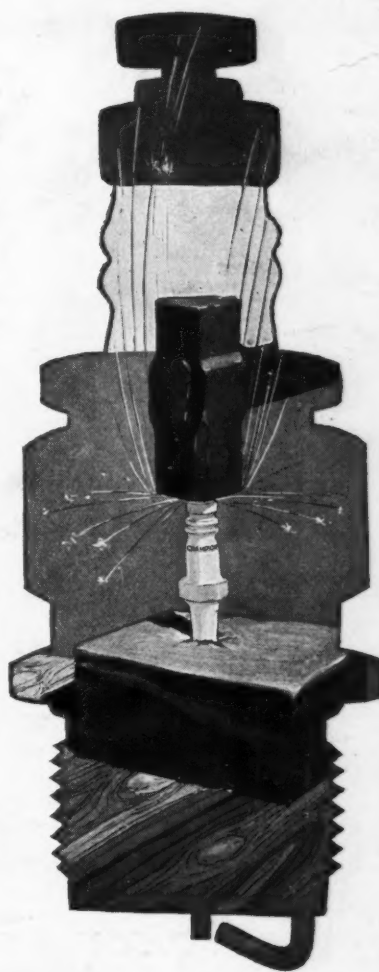
Champion dependability accounts for the fact that Champion Spark Plugs have been adopted as standard equipment by more automobile, truck, tractor and engine manufacturers than any other make of spark plug.

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is on the Insulator and the  
World Trade Mark on the Box*

**Champion Spark Plug Company, Toledo, Ohio**

*Champion Spark Plug Company, of Canada, Limited, Windsor, Ontario*





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Canadian Factory—Brantford, Ont.



# JOHNSON'S CARBON REMOVER



# MOTOR AGE

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Just as Hercules Giant Plugs have proven their efficiency in motor cars and trucks, the "Tractor Special" has made a name for itself in the tractor field.

Hercules Plugs can be sales leaders for you. They are being advertised in the leading national magazines and farm papers, and every advertisement instructs the reader: "Ask your Dealer for Hercules Plugs."

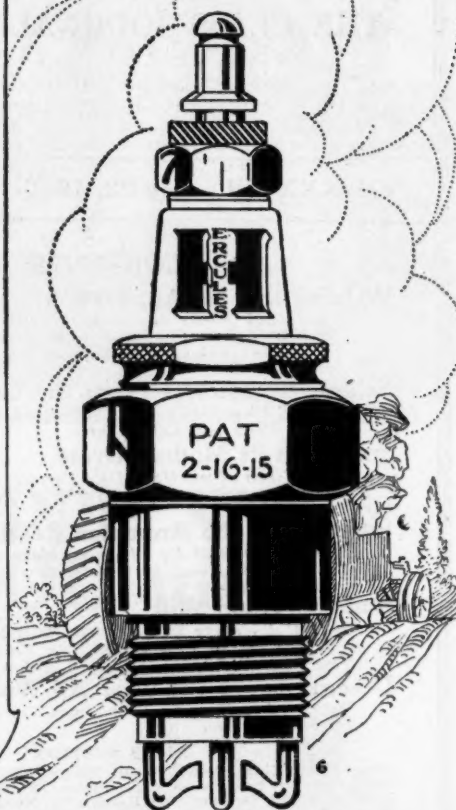
Some of the readers will ask you. You're to blame if you can't give them Hercules value. You can be a Hercules Dealer, too—you can increase your sales with Hercules Dealer Helps.

Just write today for details.

### Tractor Special

The average automobile spark plug was never designed or built to withstand the extreme conditions encountered in the tractor motor, where low grade fuels, extreme heat and oily cylinders are the rule. Constant plug changes mean delayed work and are costly. HERCULES "Tractor Special" spark plugs were designed and are built to meet the requirements of the tractor motor. They will give every ounce of power even from cruder forms of fuel, will not foul from oil, carbonize or leak compression. Porcelain breakage is eliminated by the massive, "over-size" stone insulator. They pay for themselves in saving of fuel, of time and annoyance. Write for size chart. Eclipse Manufacturing Company, Indianapolis, U. S. A.

*Ask Your Dealer for*



# HERCULES

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*One of the advertisements that are causing motorists all over the country to demand Hercules Plugs. These advertisements appear in the leading national magazines and farm papers.*

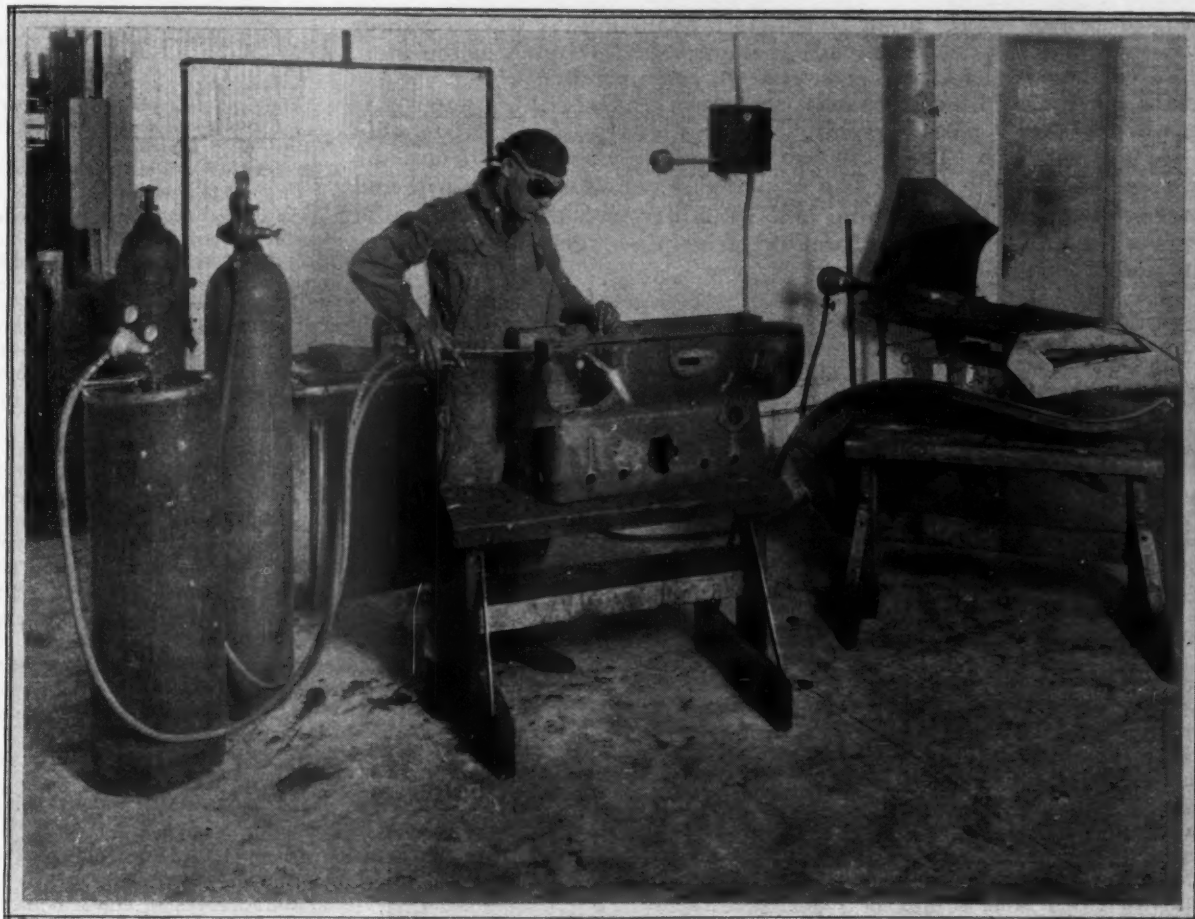
ECLIPSE MFG. CO., Indianapolis, U. S. A. Makers of

# HERCULES

## GIANT SPARK PLUGS



# MOTOR AGE



## NEW FIELDS OF PROFIT OPENED BY WELDING

**T**HE present acute parts situation makes it quite important that every dealer look into the subject of autogenous welding, because by that process it has been possible in the past to reclaim thousands of broken parts by re-uniting the broken pieces with the intense flame of the welding torch.

It is easy to see what this means. It means that instead of having to write the factory for parts and thus tying up work on a car or truck, it is possible to make a repair and have the car or truck out of the place within a few hours, or even less, if the job is a small one. It means the dealer need not worry quite so much if his stock of parts gets low.

The installation of a welding outfit puts the dealer in a more independent position. Besides, the portable feature of these outfits increases the scope of the dealer's service, because it then

becomes possible for the dealer to send a service car with the welding outfit in it to a farmer whose tractor might be stalled in the busy season with a broken unit and which the welding outfit will again put into service within a short time. Even if such a part has to be removed and brought to the service station for welding and again cartied out by the service car for installation, the chances are more time will be saved than by sending to the factory.

It is to get the dealer and his men better acquainted with the welding process and its application to the automotive service business that the series beginning on the following pages have been prepared. It is not intended that a man will become an expert welder after reading these articles, but we feel he will know enough about welding so that, with practice, he will become sufficiently expert to handle most any sort of work.

# AUTOGENOUS WELDING

## WHAT IT IS AND HOW IT IS APPLIED

**EDITOR'S NOTE**—The purpose of this series of articles should not be misunderstood. It is not expected that a man can become an expert welder simply by reading the series. Careful study and practice of the operations described, must be carried out step by step until proficiency is attained.

These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. It is likely that the first few months following his instruction will bring up many problems that may be solved more readily with these articles at hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the automotive repairman.

**A**UTOGENOUS welding is the term applied to welding accomplished with the aid of the blow torch.

Literally, the word means "self-producing." Actually, the word autogenous is applied to any blowpipe process where two like metals are fused together, and is thus distinguished from brazing and soldering on the one hand and welding as practiced by the blacksmith on the other hand.

The popularity and almost universal use of the oxy-acetylene torch is based on the fact that it furnishes intense heat at reasonable cost and convenience. To date, the combustion of the two gases, oxygen and acetylene, have given the results desired in the most satisfactory manner; perhaps at some future date a better running mate will be found for oxygen but at the present time the use of acetylene is almost universal.

The oxygen is obtained from a tank of liquid oxygen, while the acetylene may be supplied either from a tank or may be generated in an acetylene generator. The two gases are thoroughly mixed in the torch and are burned after they have issued from the tip. The oxygen in the air aiding in securing complete combustion.

The intense heat thus obtained quickly melts the common metals so that the adjacent edges of two pieces are readily fused together, so that when the job is finished they will be like one piece.

A torch, somewhat similar to the one employed for welding, is used particularly for iron. It is a fact that iron will burn in an atmosphere of pure oxygen, although it will not burn in air—which is only one-fifth oxygen. Consequently, iron may be cut by burning by supplying the necessary oxygen and also the heat to maintain the temperature of the iron above the burning point.

Personal instruction is advised wherever possible and it is advisable to attend one of the welding schools operated by various interests in different parts of the country. Sometimes these schools are run by companies interested in selling welding equipment, and then again automobile schools give welding courses. This welding series is of service to such pupils as a reference.

### Instruction Will Prove Helpful

Reasonable proficiency in welding automobile parts can be obtained in from one to three weeks according to the ability of the operator and the earnestness with which he applies itself.

After working by himself for a few weeks, it will be found very advantageous for the beginner to take additional instructions for a brief period, as his

experience will then enable him to comprehend the instructions more intelligently than in the first instance. Also it gives him an opportunity to correct any faults of technique.

The complete oxy-acetylene welding unit, Figs. 1, 2, 3 and 4, ready for work consists of a blowpipe connected up to acetylene and oxygen cylinders by suitable hose. Each hose is attached, not to the tank itself, but to a pressure reducer and regulator. Each regulator is supplied with two gages; one gage registering full tank pressure and the other the pressure of the gas after it has passed through the reducing valve. When the apparatus is all connected up both oxygen and acetylene lines are provided with three valves. In each case, there is a valve at the tank, the regulator valve, and the valve on the blowpipe handle. The regulator valve handle is the one through which the pressure is adjusted.

Manufacturers of torch equipment are divided into two main camps, those who champion the use of acetylene at low pressure, and those who advocate its use at medium pressure. A low pressure torch will use acetylene under a pressure of a few ounces while a medium pressure torch operates under a pressure of a few pounds. In the former type the acetylene is drawn into the mixing chamber of the torch through the action of the oxygen working on the injector principle, while in the latter type the acetylene enters the mixing chamber impelled by its own pressure.

There is no intention of entering into a discussion as to which type is better. It is a fact that both types are in successful use and both types are manufactured by large and successful companies.

In the early days high pressure

*A standard stationary welding and cutting plant as produced by a prominent manufacturer includes the following equipment:*

*Acetylene generator or tanks.  
Oxygen tanks.  
Welding torch with five tips, graduated sizes.  
Cutting torch with five tips, graduated sizes.  
Acetylene regulators with pressure indicators.  
Oxygen regulator, for welding, with high and low pressure indicators.  
Oxygen regulator for cutting with high and low pressure indicators.  
Oxygen and acetylene hose for welding, 12 ft. lengths.  
Oxygen and acetylene hose for cutting, 12 ft. lengths.  
Colored eye glasses, wrenches, hose connections, etc.  
Assortment of welding supplies.*

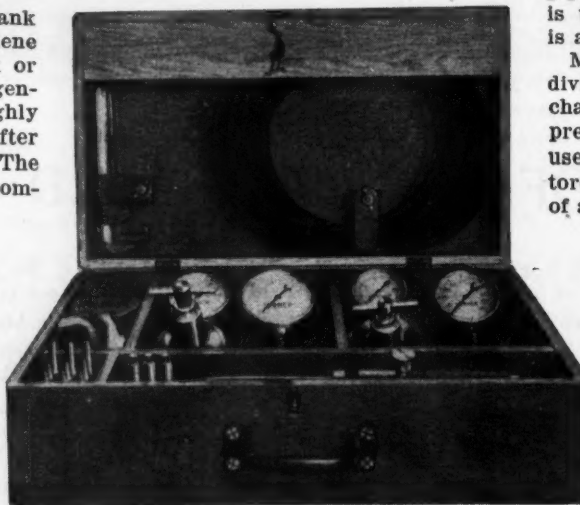


Fig. 1—Here is a welding outfit complete except for oxygen and acetylene tanks. The equipment includes a torch, an assortment of tips, fluxes, acetylene and oxygen regulators and gages, and hose. This equipment lists at \$150



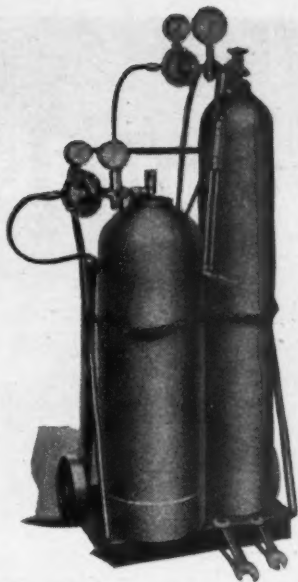


Fig. 2—Welding outfit mounted on truck and all ready to use. Note the two gages and the regulator connected to each tank. The gage nearest the tank in each case shows the pressure in the tank. From thence the pressure is reduced by the regulator and the value of this reduced pressure is indicated by the second gage. The pressure is adjusted by the handle of the regulator

torches were used exclusively but at the present time their use has been entirely abandoned in this country.

Oxygen is usually supplied in steel cylinders or tanks. It is pumped in at a high pressure, usually about 1800 lbs. per square inch. The oxygen thus contained in a standard cylinder would occupy a space of 200 cu. ft. at atmospheric pressure. The amount of oxygen in the tank is proportional to the pressure and, therefore, the high pressure gage on the regulator shows the quantity in the tank. When it is full, the gage registers 1800 lbs. When the gage shows 900 lbs. the tank is half full or contains 100 cu. ft. Similarly a pressure of 450 lbs. indicates 50 cu. ft.

Oxygen, when combined with various combustible substances, such as gasoline, acetylene, etc., forms an explosive mixture. It may also form an explosive mixture in the presence of grease or oil. Consequently, the oxygen regulator and the valve of the oxygen cylinder should not be greased or oiled at any time. Likewise, the gages on the regulator should be free of oil and grease.

An oxygen cylinder when filled should be handled carefully. It is under an enormous stress, 1800 lbs. per square inch, and although it is probably well able to stand abuse it is, nevertheless, desirable to treat it carefully and not throw it around too much.

When the cylinder is not in service, the valve should be protected by means of a cap which comes with it. Before attaching a regulator to the cylinder, the valve should be opened just a trifle both to clean out the valve and to see that it is operating properly.

It is not safe to store acetylene in a



Fig. 3—Portability is important. It is an advantage to be able to take the welding outfit to the job. Hence the desirability of mounting the equipment on a truck as shown. It will be noted that this outfit is connected up ready for use. Various sizes of tips are carried on the top cross bar of the cart frame (Oxweld equipment)

tank the same as oxygen. Acetylene under high pressure is explosive; it is subject to detonation the same as dynamite, TNT and others of the same ilk. For this reason, the acetylene gas is dissolved in acetone and this liquid in turn is soaked up in a porous material which fills the interior of the tank. The pressure under which the acetylene gas is dissolved is never more than 250 lbs. Therefore, when the acetylene valve is turned on and gas is allowed to escape, the gas makes its way out but the acetone in which it was dissolved is held by the porous material. The usual tank of acetylene contains 300 cu. ft. of gas. No blowpipe that will empty the tank

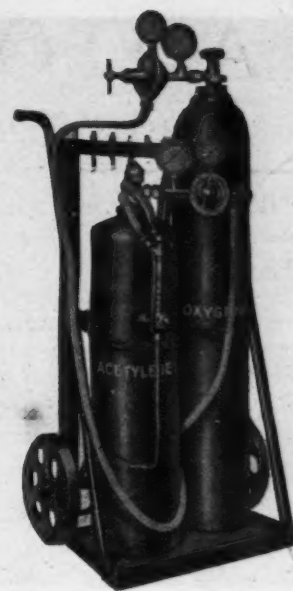


Fig. 4—There is no difference in the oxygen and acetylene tanks used with these various outfits. That is to say any brand of oxygen or of acetylene may be used. The variation is in the design of the torch, gages, regulators, etc.

in less than seven hours should be used. If a greater gas rate is required, two tanks connected together should be employed. If the tank is emptied in less than seven hours, the liquid will be drawn out with the gas.

As in the case of the oxygen tanks it is desirable to handle the acetylene tanks carefully. It is not wise to drop them or bang them about unduly. They should be kept away from fires and out of the hot sun. The best place is the coolest place.

Before connecting the acetylene regulator to the tank be sure that the cylinder valve is operating properly and that there is no leakage around the nut of the stem. Acetylene is inflammable and when mixed with the right proportion of air is explosive and, therefore, leaks at any point are to be avoided. This applies equally to cylinder valve, hose and connections.

If the tank valve has a cap see that the cap is always in place before moving the cylinder.

Do not transfer acetylene from the cylinder to an empty tank.

Avoid large volumes of acetylene under pressure.

Acetylene produces an explosive compound when brought into contact with pure copper. Therefore, copper must never be used in acetylene equipment. Brass or bronze are safe, however.

Never use acetylene at a pressure of more than fifteen lbs.; anything above this is dangerous.

Since tank acetylene is dissolved in acetone and not simply compressed like oxygen, it is impossible to use a gage to indicate the quantity in the tank. Therefore, the quantity of gas used on a given job or the quantity of gas in the tank from time to time must be determined by weighing. There are 14½ cu. ft. of acetylene to the pound.

#### In Next Week's Issue REGULATORS

will be taken up and their mode of operation described.

These articles on Welding are vital to the service business of the automotive dealer. The scarcity in parts which is now existent can be helped out by the rehabilitation of the old parts and in the case of broken parts, Welding is an important factor.



The driveway of the Bakersfield Garage and Auto Supply Co. is wide enough for two cars to pass and is flanked on either side by an attractive display of parts and accessories. The owner driving past is often prompted to buy something he sees, the sale of which might have been lost otherwise

## SELLING ACCESSORIES FROM THE CAR

A Novel and Profitable Plan of Arranging the Stock So That the Owner Cannot Help But Being Reminded of Its Presence Every Time He Enters the Building

**B**AKERSFIELD, CAL., July 20—"Drive in—you can buy what you want directly from your car."

That's what E. T. Erb and J. S. Drury visioned some fifteen years ago when they started in a meagerly equipped service shop in a basement with a shoe-string for capital. To-day, the Bakersfield Garage & Auto Supply Co. represents an investment of \$350,000 and has one and one-half acres of floor space.

From the very first the concern has leaned backward, trying to be on the square and every man who goes to it for service knows that what he will get will be—Service—courteous, prompt and efficient—for that is the motto of the company and upon that policy has builded a business which has a monthly turnover of something better than \$50,000, and which has resulted in the foundation of a service business which for volume of business and for equipment is said to be the best in the southern end of the San Joaquin Valley.

### Convenient Service

"We define service," says sales manager Thrasher, "as something which must be courteous, prompt and efficient and which shall carry only a reasonable charge, and our every effort is bent toward that end."

He might have added convenience to the attributes of the brand of service the company gives. The characteristic feature of this is the "Drive in" and the convenience this is to the customer.

The "Drive In" is wide enough for two motor cars to pass easily, and leads clear through the quarter block building which

BY FRED M. LOOMIS

is devoted to parts and accessories. These border the drive on either side and are, as is the case with the displays of popular goods in the big department stores, displayed for the comfort and convenience of the purchaser. Literally, one can buy what he wants directly from his car.

The parts and accessory departments consist of three distinct parts. First, there is the stock of Dodge parts, secondly, the rubber stock and lastly, the accessory stock. In this department the service consists of convenience and promptness in taking care of the trade demand.

### Cater to Tourist Trade

The rubber stock normally will inventory about \$30,000 and the accessory stock about \$30,000. Including car sales the monthly turnover of the company is better than \$50,000. A special effort is made to attract the tourist trade, as Bakersfield lies on the main highway between San Francisco and Los Angeles and there are times when the road looks like a procession. Attention is called to the Bakersfield Garage & Auto Supply Co., by means of immense billboard signs which stand along the road.

While the parts carried are primarily for the Dodge cars and for the accommodation of the regular patrons of the company, the tire and accessory stock is so large and varied that no matter what brand of car the motorist drives he will find something to attract his attention and excite his desire.

The general shop service of the company is catholic. At present it is the inclination to restrict shop service pretty closely to the Dodge cars, but when tourists or strangers are involved no restrictions whatsoever are laid. Whatever their troubles, they are taken care of promptly. The equipment of the shop is such that there is hardly a thing which the tourist will want in the way of service which he cannot get.

The company has divided its service into general shop and repair work, magneto service and battery service, and has equipped accordingly. Primarily electrical service is intended to cover Bosch and Exide, but the company can undertake any ordinary electrical service. The shop, which is on the second floor of the building and which occupies a room 60 ft. by 50 ft., has a mechanical equipment which is superior to that usually found in towns the size of Bakersfield. Besides the regular equipment of lathes, presses, burning in stands and the like, the company recently has bought a number of machines from the United States air craft department which will enable it to do reboring and other special repair work. In fact, the facilities of the shop have been put into the class of the big metropolitan shops.

### Complete Electrical Equipment

The company prides itself upon its electrical equipment. Much of the special apparatus for the testing of magnetos and generators is of the company's own design and there is little the manager of this department will not undertake in the way of electrical service. The



battery department also is large and has capacity for recharging which is a particular convenience to the transient motorist.

Departmentization is relied upon to make good on the announced service policy of the company, which includes courtesy, promptness and efficiency as its cardinal features. In all there are eight main departments. These are:

- 1—Sales and merchandising.
- 2—Accessories.
- 3—Machine shop and general repair.
- 4—Electrical-Exide battery service.
- 5—Magneto department—Bosch and Northeast.
- 6—Tire repair and vulcanizing.
- 7—Garage and storage.
- 8—Used car department.

Competent men are maintained at the head of these.

A characteristic feature of the Bakersfield Garage organization is the segregation of the various departments. This makes for efficiency.

#### Employees' Good Will Greatest Asset

In all the company has one and one-half acres of floor space. The main building is two stories in height and measures 60 ft. by 150 ft. The new car salesroom occupies 40 ft. by 60 ft. of this, with the usual accommodations in the way of rest and comfort rooms. Above the salesroom is a room of equal dimensions which is utilized as a ballroom for the pleasure of the employees of the company. Here monthly dances are given at which the general manager of the com-



The electrical testing equipment of the Bakersfield Garage and Auto Supply Co. is most complete and there is very little work of this nature that cannot be done right here

pany meets the mechanics from the shop on a social equality and where there is engendered that democracy of association and that spirit of willing co-operation which sales manager Thrasher says is the greatest asset of the concern.

The parts and accessory departments, together with the drive in, occupy a space 60 ft. by 90 ft., while immediately in the rear of these is the garage and storage department, measuring 75 ft. by 100 ft. The shop is on the second floor and occupies a space 60 ft. by 150 ft.

But the company relies not alone on

its material equipment in the way of shops and machines for the maintenance of its policy of efficiency. The internal organization of the company partakes of the co-operative plan. It has been told how Erb and Drury started together. Some two years or more ago Erb decided he would retire from active participation in the management of the concern, so his interests were sold to various heads of departments.

#### Most Work Spot Cash

This apportionment of interest in the business has worked for the most cordial co-operation, since these executives have a personal interest in the furtherance of the business and an ambition to make the profits of the concern as large as possible. Coupled to the cordiality of feeling induced by the social mixing of the executives and employees at the balls this results in a community of interest and effort which assures that efficiency which is the company's boast.

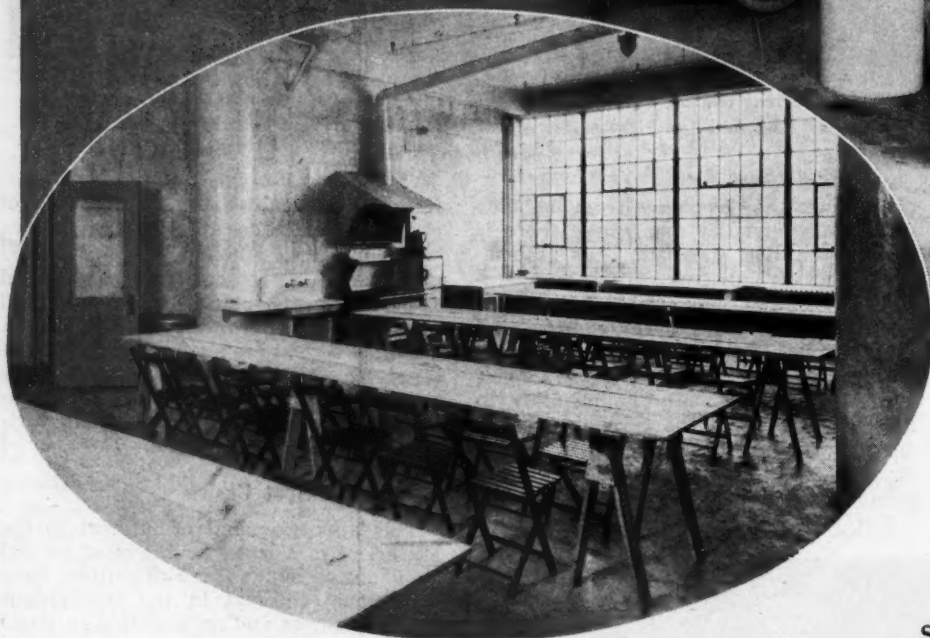
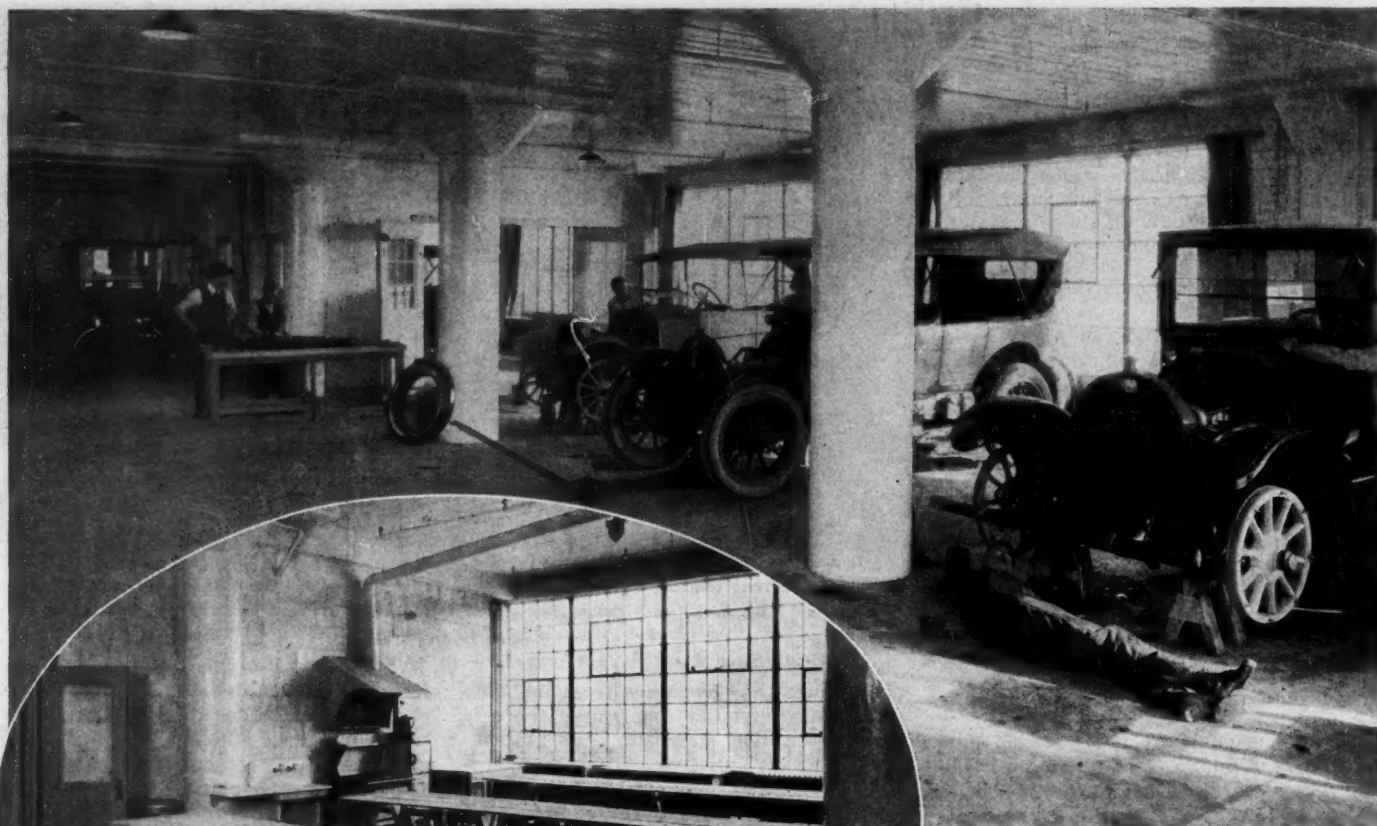
Including car salesmen, clerks and mechanics the company employs thirty-five men and women. Twelve of these are in the shop and are directly under the control of service manager Carl Bergman. Good wages are paid and the efficiency of the shop is such that a charge of \$1.50 an hour can be made for shop work.

All tourist and ordinary service is spot cash. Cars demanding service go through a course of inspection and attention which is simple but effective. Upon coming into the shop they first are inspected by Bergman, who makes the preliminary diagnosis. They go then to the shop foreman who carefully investigates what is needed, who makes out the shop ticket and who assigns the car to the appropriate mechanic.

In as much as repair work varies so in character no attempt is made to operate on the flat rate plan, but the usual charges are so reasonable that very few complaints have to be adjusted. The shop ticket carries the amount due.



The machine and repair shop is well lighted and besides the regular equipment of lathe, presses, burning in stands, etc., the company has purchased equipment from the U. S. aircraft department which enables it to do reboring and other special work



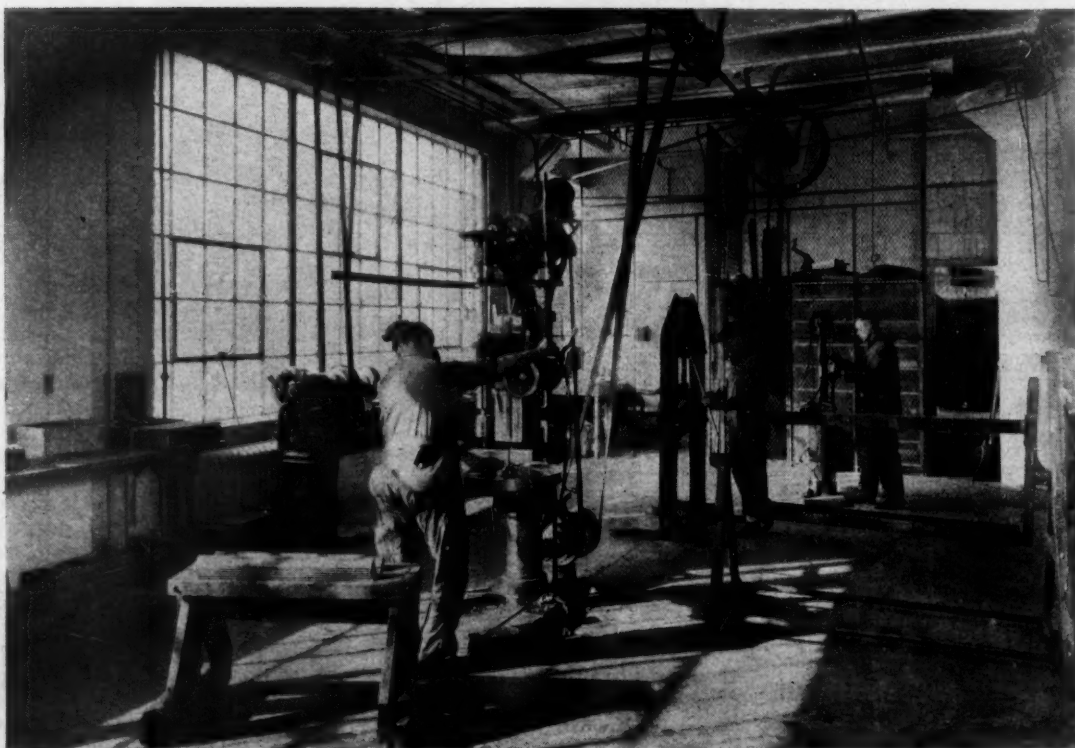
View of the shop. It is located on the second floor and has a floor space of 12,000 sq. ft., with light on three sides. Aside from the natural lighting facilities, the walls are painted with white enamel, greatly increasing the working light. The equipment is all new and modern

## SERVICE IN ITS

Some Views of the Service Station of Neb., Showing the High Plane to Which

One of the most important features of cementing the organization together is the lunch room. It has been found that the daily gatherings have brought out a feeling of comradeship among the employees that is not attainable in any other manner. It is intended to have prominent speakers address the employees from time to time

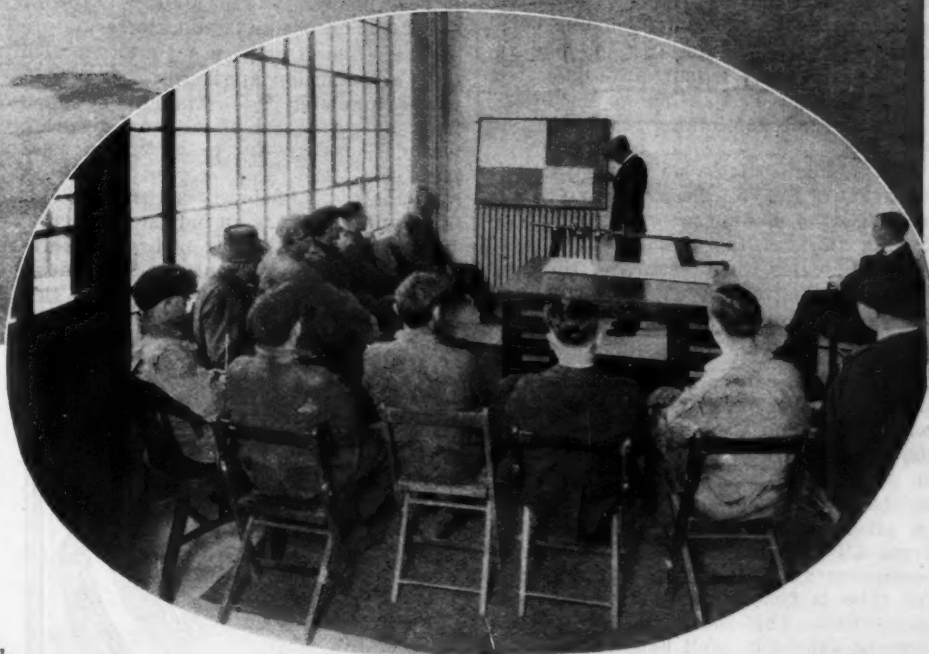
The machine department of the shop is equipped with the latest time and labor-saving devices. Cleanliness here as everywhere in the building is scrupulously carried out. Notice the light streaming through the big windows







The photograph above shows a part of the roof. It is possible to run the cars out on the roof, giving an ideal place for tuning cars. Most garages have to do this on the street, but it is done without interruption and free from the danger of having some one smash the fenders



## MODERN DRESS

the Western Motor Car Co., Omaha,  
Service on the Automobile Has Risen



In the oval is shown the conference room. This room is used for dealers' meetings, conferences of department heads, etc. Just now, there is in session a school of instruction. These schools are held at intervals and it is by this method that the shop force is kept familiar with the various features of the work

Left—Looking north along the benches in the shop. This gives a splendid idea of the lighting. Good light means better work. These are but a portion of the men employed, but it gives an idea of the size of the force. None but the highest class mechanics are employed, enabling the company to give guaranteed service

# Interpreting the Ammeter Reading

One Is Able to Glean As Much Information with an Ammeter and a Voltmeter As Can Be Determined by Any Other Means. For This Reason These Two Instruments Are an Indispensible Part of the Testing Equipment in Any Electrical Department

WITH a little knowledge of electrical apparatus and with the aid of two electrical instruments, it is possible to find out as much about any piece of a car's electrical equipment as if one had a complete testing research laboratory at his disposal. To many, it seems, the testing of electrical equipment necessitates a most amazing array of test devices, including every conceivable type of meter. The two instruments, voltmeter and an ammeter, can tell one as complete a story about any defective apparatus as it is possible to be determined, but the whole thing rests with the operator.

The ammeter tells a different story from that of the voltmeter. The ammeter indicates the amount of current that is flowing through the circuit. The voltmeter indicates the pressure of the circuit. In this story we take up the ammeter and next week the voltmeter.

## Should be Portable and Strong

A good deal can be said about the ammeter to choose. The meter used in the service station for general testing should be portable. It should be light in weight, and still solidly constructed so that the rough usage which it will be given, will not effect its accuracy. From all indications it seems that the permanent magnet, moving coil, d'Arsonval type is best suited for the service man's use. The meter and its moving element should be well balanced so that if placed in a slightly off level position, its reading will still be accurate. A good standard make like the Roller-Smith, Westinghouse, Weston, General Electric, and others with which the meter using public is familiar, will be found very reliable. The capacity of the meter should be capable of being measured on several scales, for greater accuracy is obtained in this way than by reading the smallest currents on the large capacity scale.

It should always be borne in mind that an ammeter must never be connected in shunt or across the wires of a circuit. To do so is certain to wreck the meter. An ammeter operates on an extremely small amount of current. In fact, a meter having a milli-volt scale reading to say 50 milli-volts requires only 0.050 volts to swing the needle the full length of its travel, so it is plain to see that if the ammeter is shorted across even a dry cell, it would probably be burned out.

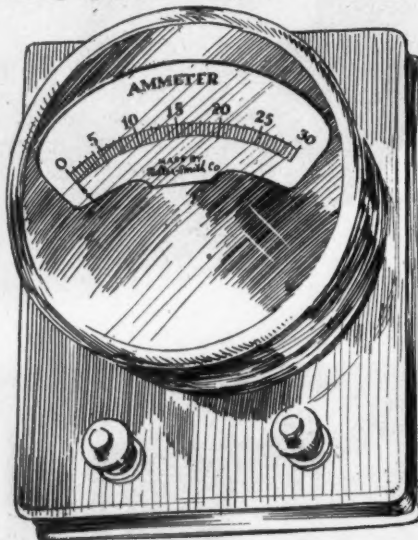
It is well to explain here that a shunt is merely a bridge, so to speak, for the current to pass over, and the meter across the ends of the shunt measures the effort exerted by the current in passing over the bridge. If, say, a current of 100 amperes is passing through the shunt,

BY ROY E. BERG

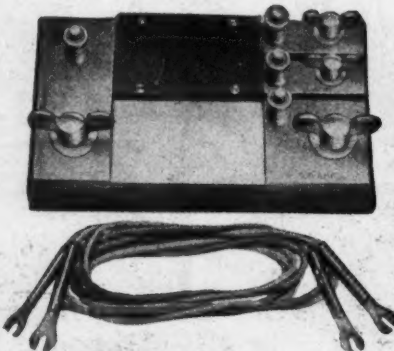
only about one per cent of that quantity will pass through the meter.

The three common ranges of the ammeter scales are of 300 ampere capacity, 30 ampere and 3 ampere capacity. The large range scale is used for starting motor tests where the current discharge is very heavy. The 30 ampere scale for generator output and generator armature testing. The 3 ampere scale is for field tests and ignition apparatus.

The ammeter, as ordinarily supplied with the car, is not of the most accurate type. They are apt to vary somewhat from the true reading, but they are, nevertheless, sufficiently accurate to suit the requirements as an indicator for cars. The reading of the car meter is, therefore, not to be discounted as valueless, for a great deal can be read from this meter before going to the trouble of hooking up another meter.



An ammeter is the hydrometer of the electric system



This is a shunt for use with an ammeter having several scales. The connectors are a part of the meter circuit and should always be included

If there is doubt about the functioning of the generator, stop the engine, if it is running, and observe the moment at which the ammeter cuts itself off from the circuit. There should be a momentary discharge of about 2 amperes. If this occurs, then the cut-out is functioning as far as this much of its performance is concerned. The next step is to remove the cover of the cut-out and then close the contact points. There should be a fairly live spark at this point, for the voltage of the battery is thrown across the terminals of the generator in so doing. If the generator is in good order, there should be a discharge of approximately 8 to 10 amperes. The resistance of the armature of the generator is rather low, being less than 1 ohm, and, therefore, the current consumed by being shorted across the battery will be rather heavy. If though, it happens that when the cut-out points are closed in this fashion, the discharge is only about 2 amperes, then there is something wrong. It might be that the brushes of the generator are not making good contact, which will probably be caused by either one of two reasons and sometimes by both. The surface of the commutator may be greasy, in which event there will be little current transmitted through the armature, and the brushes themselves may be worn, which will allow of poor contact, thus preventing the flow of current. A combination of these very often results. After having tested out the generator circuits in this manner, one is able to tell what is wrong, if anything. Greasy brushes may allow the armature discharge to be anything between 2 and 10 amperes. A broken field wire or one with impaired insulation will allow the field discharge to register anywhere between 2 and zero amperes.

## Meter Reading Often Varies

Many times a meter will show a widely varying reading during operation. The needle in cases of this kind will fluctuate widely and swing violently over the dial. There are several attributable reasons for this action. Sometimes it is caused by the generator and other times by the cut-out. If it is caused by the generator, the needle will continue to fluctuate even after the contact points of the cut-out are held forcibly together. But, if the swinging needle comes to a steady position when the cut-out points are forcibly closed, then the trouble can be traced to the cut-out. With this determined, the points should be released and if arcing is observed between the points, probably the points themselves are pitted, causing poor contact or else the winding of the cut-out may be open circuited through a loose connection.



The whole secret of the information obtainable with the ammeter is in the interpretation of the reading, and in order that the interpretation may not be construed to some other meaning it is well to bear in mind the following points when reading the instrument. The first thing to do is to be sure that the meter will not be injured after the connections are made and the current turned on. Using a portable instrument with several scales, which makes it adaptable for every range that may be encountered, the highest scale should be the first one connected. Then, if the reading is lower than the included range of the next lowest scale, shift the connections, after having first broken the circuit at the switch, to the next lowest range scale. Then, if the capacity of this scale is taxed to less value than the next lowest scale, use the lowest scale so as to use as large a deflection as possible. A meter is more accurate when using the largest convenient scale, also, the reading is rendered more accurate.

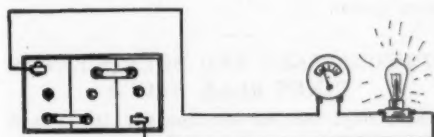
#### Parallax Causes Mistakes

Read the scale of the instrument by standing or looking directly at it. Parallax is a term applied to the difference in reading obtained by looking at the face of the meter in a slantwise direction. Many meters are equipped with mirrors on the face of the scale back of the needle. This is for the purpose of lining the reflection of the needle up with the needle itself, which insures that there will be no parallax.

If the meter is equipped with shunts for utilizing the different scales, the connecting wires to the shunts, which are part of the equipment with the meter

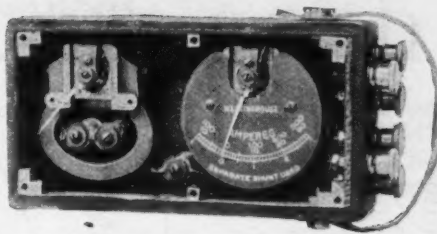


Like the water wheel above, the ammeter measures rate of flow



Here the ammeter is measuring the rate of flow through the lamp

should be the only ones used for this purpose. Other wires will have a different resistance and this will alter the reading of the meter. It should be remembered that these wires are a part of the meter circuit. See that the meter points to zero. The adjustment which takes care of this is at the needle pivot center. By removing the small protective plate, the adjusting screw will be uncovered, which should be turned until the needle is brought to the zero mark. If it is found that the needle does not return to zero after the passage of current, it is a sign that the needle is sluggish. Readings taken with this kind of a meter should be taken while the meter is tapped with the finger.



A Westinghouse combination testing ammeter and voltmeter

With regard to the testing of lighting circuits, the dash board ammeter may also be used to good advantage. Ordinarily, the headlights, the dashlight and the taillight consume about 7 to 8 amperes with the lights as furnished by the manufacturer. At times one finds the individual who, to satisfy his needs for greater brilliancy, has installed the largest lamps obtainable. His ammeter probably shows more than 10 or 12 ampere discharge, so this would have to be taken into consideration. On any car where the ammeter indicates a greater discharge with the light switches on than that which would be indicated by the lights themselves it shows that current is leaking out somewhere. If any one circuit shows more discharge than it should, examine first the light and socket. If no loose connections are found at this place, then look at the switch connections and lastly the switch itself. In this way the most accessible parts are examined first with the least expenditure of time and it is more than likely that if any trouble exists, it will be found at these places.

#### Locating Battery Troubles

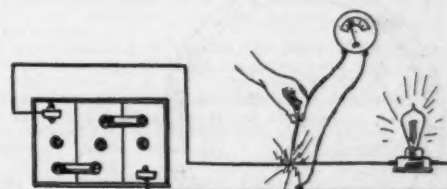
When the complaint is heard that the battery runs down, determine first, if possible, whether the ammeter has been habitually showing a slight discharge with the engine shut off. If it has, by applying those principles described above, the circuit can be located. If the ammeter has not been showing a discharge, then disconnect the battery terminal leading to the starting switch and insert the portable ammeter. The 30 ampere scale should be used for this and if the discharge is less than the capacity of the 3 ampere scale, the connections can be changed at the shunt for the lower scale. If it is found that there is a light current consumed here which is not indicated on the dash ammeter, then look to the starting switch and its connections, for it is evident that somewhere between the ammeter and battery there is a leakage. The starting motor wires being very heavy are probably in good condition, but it is often found that the insulation of the heavy wire is impaired at the place where it passes out from the battery box. The thin metal wearing on the insulation causes a short circuit that draws a very heavy current. A break of this kind depletes the battery in short order, and is one of the first places that should be examined if the complaint is of this nature.

When the apparatus is removed from the car, say a non-operative generator,

then the portable meter is brought into play very effectively. After making a good scrutiny of the machine to see that no wires in view are shorted on the field frame, or that nothing is radically out of place, then try to run the generator as a motor by connecting it up to a storage battery. It probably will not run, for that is why it was removed, but connect an ammeter in the circuit and see what it tells. If the reading is more than 8 amperes some wires are probably shorted in the armature. Next one of the brushes should be lifted, (not the third brush, if it is of this type) and then the new reading of the meter should be observed. If it is less than 2 amperes, look to the field coils and their connections.

#### Disassemble to Make Test

At any rate the generator will have to be disassembled in order to get at the coils, which will allow the ammeter to be used for making a more extensive test. If the ammeter is of the separate shunt type, it can generally be run without the shunt as a milli-voltmeter. This very low scale comes into handy use for testing armatures. By connecting the armature in series with a light to the 110 volt circuit and then admitting this current through the coils of the armature by two conductors on opposite sides of the commutator, a convenient means is produced whereby the low scale will tell the whole story of the winding. This current in passing through the armature travels around through the various coils and comes to the surface at each commutator bar. So by connecting the ends of the milli-voltmeter terminals to sharp pointed testers, the voltage drop or difference between each pair of commutator bars can be measured. If the pressure between each pair of adjacent segments is the same all the way through, then the armature is all right. But if something is wrong it will be indicated immediately, for the coil that has a short circuit will register a different pressure drop at the bars where it is connected. If it is found that on one side of the connections which lead the current into the armature that there is no indication of a pressure drop, then there is a short circuit in this half of the armature. By continuing around this side of the commutator the two bars will be located where the break in the line exists, and a sharp reading will be given by the meter. If several coils in the armature have been burnt, due to defective insulation or some other cause, then the meter will show a slightly smaller reading.

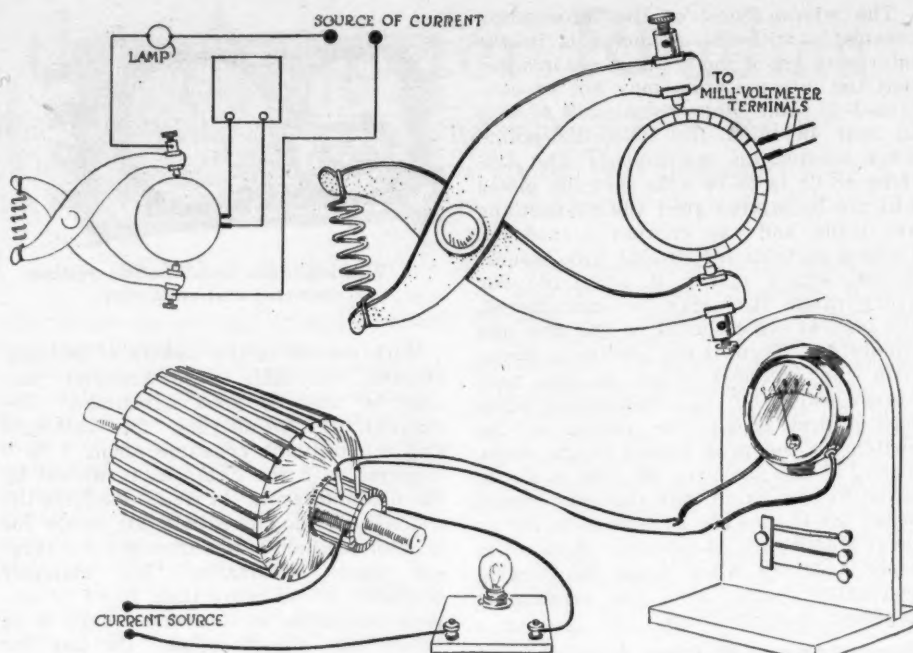


The wrong way to connect an ammeter. An ammeter will be hopelessly ruined if shorted across a storage battery unless its scale has a capacity of 1200 amperes.

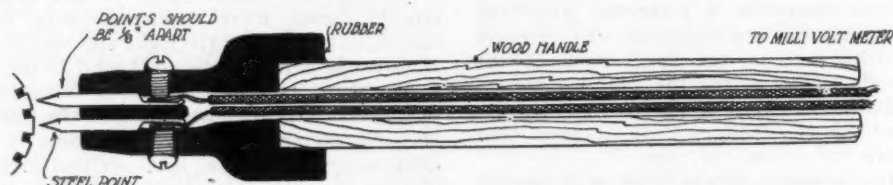
Several little appliances can very easily be made to assist in this armature testing. A scissor-like arrangement of a clamp made to grip the armature in its jaws serves to lead the current into the coils. A clamp of the construction, as shown in the illustration, can be made from fibre, or some other electrical insulation material. Sharp steel points are provided at the ends which grip the commutator. The wire leads can be connected to the binding posts provided on the ends and the milli-voltmeter, which is simply a converted ammeter, can be used to determine the winding condition. When using test points of the individual style for this testing, the operator's two hands are necessary to hold and spot the points on the adjacent commutator bars. With an instrument, as shown in the sketch, but one hand is necessary. A test point pencil of this can be made by anyone familiar with the ordinary tools found in a service station. The handle is drilled out to accommodate the entrance of the wires and these are secured to the test points by means of small set screws. The test points should be placed about 1/8 in. to 3/16 in. apart as they may then be placed on any commutator, with the points pressing adjacent bars of the commutator.

#### Testing Starting Motors

When testing starting motors, the drop of potential gives very accurate results. Starting motors by virtue of the heavy currents that are necessary to turn the engine over, require very heavy wire in their windings. When it is appreciated that the current passing through a starting meter in locked position, very often occasioned by a cold engine and stiff oil, is over 500 amperes, it is easy to see why this heavy wire is needed. The drop of potential method which is the same as that described above for generator armatures requires a larger current passage for starting motor armatures, and it may be necessary to use two or three lamps connected in parallel and these in series with armature. The field connections of a starting motor being in series with



A test clamp is easily made for clamping over the commutator so as to lead the current into and through the coils. When many armatures are to be tested, this is a time-saving feature and makes it possible for one meter to accomplish more work



The test pencil shown above is a valuable tool testing armatures as it requires only one hand to operate, which gives one opportunity to turn the armature and work with rapidity. The connections are also shown

armature winding must be singled out separately with aid of test points so that the drop of voltage through the two or four field coils can be measured. And if it is found that the resistance is the same in the four coils it is fairly safe to assume that field windings are in good condition.

Ignition systems can not be completely tested with an ammeter, but enough can be learned to say whether or not a new coil or some other part is needed which is all that is necessary. The breaker points can be tested with an ammeter but an ordinary lamp can be connected in series with the breaker which will light every time the circuit is made. The coil, because of the high resistance in the secondary winding, can be tested only partially. The primary winding is of rather low resistance, and on 6 volts pressure will consume about 2 amperes. On many systems there will be found a small resistance wire which should be included in the circuit when the battery is connected across the coil. Otherwise, the current flow will be too heavy and the winding is apt to heat up and become injured.

#### FYRAC ENJOINS CUT-PRICE DEALER

The Fyrac Mfg. Co., Rockford, Ill., has just been granted a permanent injunction against the Graves Cycle & Auto. Supply Co., of Bay City, Mich., preventing

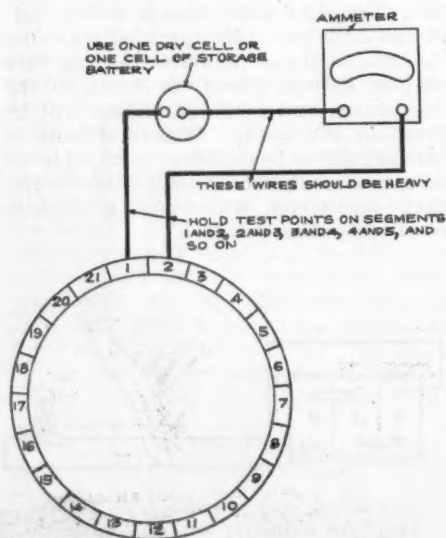
the misuse of their trade name "Fyrac" in connection with cut-rate advertising.

The attorney representing the Fyrac Mfg. Co. in reality plead the cause of all manufacturers in praying for protection against the abuse of dealers, who seek to attract people into their store by advertising a nationally known article at a cut price.

#### HUDSON, ESSEX AND DORRIS ENTER PIKES PEAK RACES

The first official entries for the Pikes Peak Highway automobile races came from the Hudson Motor Car Co. of Detroit, which was the first to enter a Hudson and an Essex. In 1916 the Hudson company carried away the honors by making the record time over the 13-mile boulevard from Crystal Creek to the summit of Pikes Peak in 18 min. 24 7/10 sec., when Ralph Mulford established the record in a Hudson. The track this year is in much better condition than it was in 1916 and a faster record is liable to be established when it is taken into consideration that faster and more powerful engines are now in vogue.

Another entry of importance officially received is that of the Dorris Motor Car Co. of St. Louis, through its Colorado agency, the Brinker & Vaughn Sales Co. of Denver, which has entered a car for the open event for cars having a displacement upwards of 288.6 inches.



A simple way to determine armature trouble with an ammeter



# BUILDING GOOD WILL

ANY business man with foresight is very much concerned with the building of good will. In the automotive business this is particularly true, for there is a feeling among purchasers of motor cars that while some particular car or truck may develop faults of an unusual nature; if such truck was purchased from the right kind of a dealer, the customer is certain to receive fair treatment. It is, therefore, of the utmost importance to a dealer to earn the reputation of being the "right kind" of dealer. To gain this reputation among owners of cars or trucks of makes other than those handled by him gives such a dealer a very considerable advantage, for when such owners purchase new cars or learn that their

friends contemplate the purchase of new cars, the name of the "right kind" of dealer is sure to be remembered.

One of the best ways to gain anyone's good will is to perform some small favor which in no way obligates the recipient.

A very effective method of gaining good will has been pursued for some time by the Southern Motor Co. of St. Louis, distributors in Southern Illinois and Eastern Missouri for National, Grant, and Sayers cars, and Luedinghaus trucks. Salesmen and service men of this company are constantly on the alert for instances which they may see on the street,

(Concluded on Page 47)

## The Letter Which Is Building Good Will

H. P. FEDERSPIEL, GEN. MGR.

**SOUTHERN MOTOR Co.**  
DISTRIBUTORS  
3017-19 LOCUST ST.  
ST. LOUIS, MO.

June 28th, 1920.

Mr. J. H. Whittmore,  
Buckingham Hotel,  
St. Louis, Missouri.

Dear Mr. Whittmore:

The right rear wheel on your car bearing license #29732 is running out of true. The wear on tires and bearing and the danger of accident is excessive in a case of this kind.

As we do no repair work except on lines which we distribute, we have nothing to gain by telling you of this except the pleasure that comes from a small service cheerfully performed.

Our salesmen and service men are always awake to any instance of this kind where we can render a service to any owner of a motor car.

Cordially yours,

SOUTHERN MOTOR COMPANY.  
*H. P. Federspiel*  
President.

RPF/MS

BELL, BOMONT 921  
KINLOCH, CENTRAL 118

*National*  
SIX AND TWELVE

McELROY-SLOAN SHOE COMPANY  
St. Louis, Mo. June 23rd, 1920.

Southern Motor Co., St. Louis, Mo.  
Your favor of the 18th to Mrs. McElroy, regarding the right rear wheel of her car not running true, to hand and in reply to same would say I thank you for your courtesy in this matter. I think such service as this will in the long run, yield results. Yours very truly,  
W. F. McELROY.

EISENSTADT MANUFACTURING COMPANY  
Star Building St. Louis, June 23, 1920.  
My dear Mr. Federspiel: I want to thank you most cordially for the information contained in yours of the 19th. I was unaware of this defect and probably would never have known it without your courteous aid.  
Should an opportunity present, it would afford me great pleasure to reciprocate. Very sincerely yours,  
M. EISENSTADT.

STANDARD PENCIL COMPANY  
1822-28 Locust St. St. Louis, Mo., June 17, 1920.  
Southern Motor Co., St. Louis, Mo.  
May I thank you for your letter of June 14th in which you tell me that the right rear wheel of my car is running out of line.  
I have investigated this and have had it put in shape. That, however, is not the object of my letter. I am writing this to thank you for the interest and service that you rendered to me, and trust that some day I will be in a position to return the courtesy. Very truly yours,  
A. B. WALLACE.

CHICAGO MILL AND LUMBER COMPANY  
St. Louis, Mo. June 16, 1920.  
Southern Motor Company, St. Louis, Mo.  
We are in receipt of your letter of the 15th in reference to our car, bearing license No. 50322, and we wish to thank you for the information contained therein.  
We are going to keep your card, and some day something may come up which will be of mutual interest to us, and in the meantime please again accept our thanks for the information and the interest shown in our behalf. Yours truly,  
Chicago Mill and Lumber Co.,  
W. O. Shillington.

CHAS. L. CRANE AGENCY COMPANY  
St. Louis Insurance June 1, 1920.  
Mr. H. P. Federspiel, Pres.,  
Southern Motor Co., St. Louis, Mo.  
I wish to take this opportunity of thanking you for your note of May 24th in which you called my attention to the fact that the right rear wheel on my coupe was running out of true.  
It is little instances of this kind that make friends, and if in the future I can say a good word I shall be only too glad to do so. Very truly yours,  
W. A. O'CONNOR.

THE HOOVER SUCTION SWEEPER CO.  
North Canton, Ohio, U. S. A. St. Louis, Mo., June 24, 1920.  
Southern Motor Company, St. Louis, Mo.  
I just can't help complimenting you on the real business building idea conveyed in your letter of June 18th, calling my attention to the rear wheel on my car, bearing license No. 25832, being out of true.  
Some day I may again be in the market for a truck or car and I shall certainly want, at least, to investigate the merits of a product distributed by a firm who pays so much attention to the little things in the other fellow's car, which at the end of a year grow themselves into a big expense.  
Again let me congratulate you on the idea and wish you every measure of success. Yours very truly,  
J. G. BARRETT.

HAINES-CARPENTER DAIRY PRODUCTS CO.  
716 N. Eighteenth St. St. Louis, Mo., June 19, 1920.  
Southern Motor Co., St. Louis, Mo.  
Your letter received advising the writer that the left rear wheel on his car, bearing license No. 41005, is out of line.  
The writer wishes to thank you for this information, and assures you it is very much appreciated, as it is impossible for him to run his own car and also watch it from the rear end. Thanking you, I am, respectfully,  
FRANK A. HAINES.

## Some of the Replies Received Expressing Gratitude

MEYERS BROTHERS DRUG CO.  
St. Louis, Mo. June 17, 1920.  
Southern Motor Co., St. Louis, Mo.  
I have your letter of the 11th inst., in which you have taken the trouble to notify me that the right rear wheel on my machine is running out of true.  
When I consider the motive that prompted you in making this report I feel that it is only your just due to say that your foresight and progressive business ideas are very commendable indeed. I appreciate very much your kindness in having pointed this defect in my machine. Any concern which adopts progressive methods so far ahead of the procession is bound to reap the reward.  
My very best wishes are with you and I shall look forward to the time when I can return your favor in kind. Yours very truly,  
J. M. GALE.

NASHVILLE, CHATTANOOGA & ST. LOUIS RY.  
Passenger Traffic Department St. Louis, Mo., May 27, 1920.  
In reply to your kind favor of the 25th inst., wish to thank you kindly for this advice.  
I might mention that the untruthfulness of my right rear wheel was no doubt noticed Monday afternoon, while my brother-in-law was driving my car and that the internal shaft on the right-hand side broke that very afternoon. However, I have had same repaired.  
Again thanking you for your kindly advice, I am, very truly yours,  
WM. J. CARVER.



# EDITORIAL



## SERVICE AND ACCESSIBILITY GO HAND IN HAND

**WE QUOTE** the following: "Motor car owners ought to demand accessibility; it means dollars saved. It keeps cars out of the repair shop". The statement is taken from an advertisement of the Winton Co. It is significant of the trend

of thought that service is becoming the predominating feature of the automobile business. The cars, trucks, and tractors are made for the consumer and as such they are to furnish service. The varying prices of the different designs give different degrees and modes of travel and performance, but as far as service is concerned they should all perform with equal regularity. And the one big factor that governs the time a car spends in the repair station is accessibility.

It is interesting to note the attention being accorded the design of a vehicle from a service standpoint. The manufacturer of a well known car recently said when questioned regarding the serviceability of his car, that their concern never knew or appreciated the complexity of the disassembling processes until the car was turned over to the service men. They discovered new ways to put parts together and new ways to take them apart, and new ways to apply the regular tools, obviating the necessity of special tools, which the small town service men so frequently do not have.

One manufacturer said that they recommended an assortment of special tools for serviceing their car. Unless every service station in the country is supplied with a set of these tools it is not fair to claim accessibility as one of the outstanding features of the car, although it is true that this particular car is rather good from an accessibility standpoint. The special tools do not constitute the accessibility of the car. The car design does, and, therefore, the car that can be approached with the ordinary tools will fare better when driven into a service establishment wherever it might be.

## DEALERS—GET BEHIND YOUR PUBLIC SCHOOLS

of these efforts until a few years to come, when the present acute shortage of skilled help, no doubt, will be materially relieved.

It was a step in the right direction when the schools added manual training some years ago. Now the automotive industry, by virtue of its phenomenal growth, commands respect and recognition and our public school officials are to be complimented upon acting so wisely in adding courses directly or indirectly associated with automotive lines.

The question of where to get tomorrow's mechanics is one that affects every dealer who purports to give service on the apparatus he sells. The automotive industry has gone ahead so rapidly by leaps and bounds that the supply of skilled help in all its branches has not been able to keep pace. So

to-day there is an acute shortage of the right sort of help in the service stations all over the country. Ordinary help is not so hard to get but modern service and shop methods demand that the dealer's help be trained. A certain amount of theory is necessary and when this is properly administered along with practical shop work in our public schools, as it now is being done in many cases, there can be no denying that in the future we shall have a small army of trained men to draw from to fill our shop vacancies.

The matter of our public schools taking up automotive mechanics along with their other work is something dealers should get squarely behind and lend their full support. Individually or through associations dealers can do much to stimulate the idea throughout the country. Young America just getting out of school offers excellent timber for the automotive industry, because having the foundation to work upon, their future activities can, to a large extent, be shaped along accepted lines by the efforts of the dealer or his organization.

Every dealer organization should look into the matter now to see whether or not the schools of its community are offering its students a mechanical course as mentioned above. Concerted action will do much. Other communities have done it, why not yours?

\* \* \*

## WELDING—INSTEAD OF A NEW PART

sales departments are selling rebuilt cars at new car prices. So intense is the service work on old cars, that parts stocks are becoming depleted and exhausted. In fact, many bins of parts in the stock room have already been exhausted. And the sad part about the whole thing is that new parts are forthcoming very slowly.

Welding is one of the means that will help make the old parts new. Correct application is very necessary before attempting the repair of anything with the flame method, for it is very easy to burn and destroy a part with a welding outfit. *MOTOR AGE*, in a series of articles beginning this week, endeavors to lay before its readers a comprehensive outline of the fundamentals of welding. With these in mind, a little experience will soon give one a thorough working knowledge which will permit most any automotive welding problem to be solved.

A broken part thoroughly repaired should be stronger than it was when new, because the broken position is reinforced and strengthened and will probably not break in the old place again. This is the way some people regard a new car when they get it. After a number of things have broken from rather strenuous usage, and having been properly welded and repaired, they feel that the car is better than it was when new. At any rate, a properly welded joint will be as strong if not stronger than the old part and by thus making use of the old parts we may assist in tiding the parts business over until the shortage crisis has passed.

**T**HE credit restriction bringing with it a reduction in car sales has made the old car more valuable than ever. Some local dealers have their service establishments billed up for work two, three, and four weeks in advance. Many used car



# June Production Shows Slight Increase

While There Has Been a Sharp Decline in Demand for Cars, the Factories Are Still Behind with Orders. Dealers' Salesmen Preparing to Go After Prospects

**D**ETROIT, July 20—Approximately 5,000 more passenger cars and 400 trucks were built in Detroit territory during June than were turned out in May. Passenger cars total 161,261 and trucks 19,943 during June as against 156,178 and 19,532 in May.

The month's figures will serve in great measure to lift the spirits of leaders in the industry, many of whom had been confident that the month's report would show a decided drop in production due to the financial stringency and the ever-present transportation congestion.

## Increase Raises Optimism

The increase shown in passenger cars as well as trucks is due in great measure to the Ford factory. The Ford Motor Co. turned out 72,931 passenger cars and 10,931 trucks during June as compared with 70,000 cars and 10,000 trucks in May. Dodge Brothers also showed an increase over May, as did Buick, Overland and the majority of the others. The increase, though slight, helped to swell the total and engender a spirit of optimism taking the place of the pessimistic attitude that was apparent a few weeks ago.

While there is some difference of opinion as regards the freight situation, there is no question but that it is showing material improvements. Factories are able to get supplies in sufficient quantity to permit of continued operation in most instances and more cars are becoming available daily for the movement of the finished product. This is traceable to a great extent to the fact that manufacturers have called in their stock chasers and are not burdening the railroads with materials as they were two months ago.

## Prices of Material Down

There are two reasons for this effort on the part of the manufacturer. First, the cost of materials have been greatly reduced along many lines and reductions in others are expected. The stocks on hand were purchased at prevailing high prices and manufacturers will use up these supplies while prices of the finished product remains steady and unload all of that high priced material before there is a break in the price of cars and trucks. The financial crisis, if that is not too harsh a term, also was a dominant factor in bringing manufacturers to a realization of the necessity of turning their huge inventories into ready cash by putting it into cars and placing it on the market.

Two months ago, factory representatives were hounding the supply centers, grabbing materials without any consideration as to price in the desire of the

manufacturers to build up an immense surplus stock in order to guard against any shortage. The result was that when the financial scare broke, many of the factories had their warehouses and yards piled high with materials of all kinds, the inventories in some factories running well up into the millions. Fear of the attitude of the banks prompted them quickly to begin unloading this surplus and turning it into cars and trucks that were marketable.

While there has been a quick decline in the demand for cars, factories in nearly every instance are far behind with orders and are able to get rid of their cars in a steady stream. What effect this lack of demand will have as soon as factories have caught up with back orders is problematical, Detroit dealers and distributors, admitting there is at present no demand for cars, insist that the situation will right itself before September 1 and a normal, and steady demand thereafter is predicted.

## Consider Credit Situation

Manufacturer, distributor and dealer have had their heads together during the last few months planning ways and means to overcome the financial stringency and there seems to be a feeling among them that they have arrived at a solution of the problem. The country dealer who has been hardest hit by the attitude of his banker is receiving the active co-operation of his distributor, who in turn is being given all possible aid by the manufacturer. Bankers, too, particularly in the automotive centers are working in hearty co-operation and close harmony with manufacturers and in a manner that assures the safeguarding of the interests of the industry. Bankers in the cities, after the first wave of terror following announcement of the attitude of the Reserve Bank, realized there was more smoke than fire in the Reserve Bank edict and aside from close scrutiny of all paper and urgent efforts to persuade manufacturers and dealers to ask as little financial aid as possible, have expressed willingness to take care of their customers.

## Go After Prospects

Dealers and salesmen who enjoyed what was virtually an extended vacation during the last year are busying themselves with sales efforts, and this is expected to bring about a renewal of demand for cars. During the last year, however, the demand was so great it was impossible to secure cars to fill it, without any effort on the part of the salesmen and these prospects have never been uncovered. Vigorous campaigns have been started all along the line and the dealers now are devoting their energies

to rounding up these legitimate prospects.

The slowing up in demand is felt all down the line. Tire makers are affected to a great extent, not alone in curtailed production schedules but by the general feeling of fear on the part of the public caused by rumors of depression that still persist and make car owners think a long time before they discard their patched tire for a new one.

## Invading Foreign Market

Some of the Detroit factories are taking advantage of the lull in the domestic demand to invade foreign countries and create a market. A great portion of the output of the Hudson factory is going to foreign countries and the same is true of many other factories. In the foreign field, the passenger car builder has it on the truck maker, for there seems to be no market for trucks, though there is a steady demand for passenger cars despite high import duties and other restrictions placed on the American product by foreign governments.

Labor conditions are righting themselves gradually and while there still is a demand in some parts of Michigan and Ohio for labor Detroit factories appear to be well fixed. There has been no lay-off of any consequence, though in all factories an effort has been made to weed out the inefficient. The result has been a diligent effort on the part of labor which manufacturers believe presages a period not far in the future when labor will give a full day's work for a full day's pay.

## Railroad Deal Gladdens Detroit

Announcement of the purchase of the D. T. & I. Railroad by Henry and Edsel Ford, together with the statement, although unofficial, that they have taken over Kentucky coal property has added greatly to the optimistic feeling among manufacturers. With the memories of the hardships due to fuel shortage last winter and continued reports that conditions would be even worse the coming winter, manufacturers were fearing to face the coming of cold weather when announcement of the Ford deal brought assurances that Detroit industry would be amply cared for as regards fuel.

## MOLINE PLOW BUYS PLANT

Moline, Ill., July 17—The Moline Plow & Tractor Co., Moline, Ill., has acquired the plant and good will of the Independent Harvester Co., Plano, Ill. The latter was organized in 1905 and was first known as the "thousand farmers" concern, it being reported that most of the stock was owned by Illinois farmers. In 1913 and again in 1917, the company was reorganized to meet changing business and implement conditions.

## Sales Ability Now Needed— Order Taking Day Is Passing

**Slowing Up in Demand Compels  
Dealers to Brush Up Selling Force.  
Rising Fuel Cost Scares Buyers.**

NEW YORK, July 20—Retail sales of cars, which have been in a slump since the tightening of credit began several weeks ago, show no signs of revival, and factory branches and distributors, as well as some of the dealers in the territory, are warehousing for future demand. The market is inactive from the lowest up to the highest priced cars. The general prediction that only medium priced products would suffer heavily failed to materialize.

Cancellations have been heavy in practically all lines and "immediate delivery" advertising and sales talk is prevalent. Ford is the only car whose production is far behind demand. Sales of this car are not up to the standard of a few weeks ago, but dealers are still behind on delivery and are booking new orders of prospects who, because of money scarcity or falling off in business revenue, have given up the idea of purchasing a higher priced unit.

### Truck Market Improved

The truck market is slightly improved over that of late June. It would be even more brisk, in the opinion of dealers, but for the curtailment of credit to the financing corporations, which are able, with the support obtainable from the larger banking interests, to accept only the higher class risks for time payment sales. Banks in the territory in most cases are financing dealers in stocking trucks, but except in the case of purchasers who are bank customers, are declining to handle time sale paper, which leaves dealers with no recourse but to the financing companies to dispose of stock on non-cash sales. Industries and mercantile establishments in all classes want trucks, but a good many are unable in the present emergency to buy them outright.

A good many small town and city dealers in the New York territory, both in the car and truck lines, are being forced into what approaches at least a straight garage business. Some with adequate capital or bank support, are stocking merchandise, but others lack credit and are refusing stock offered by the metropolitan wholesale establishments. Travelers for the distributors and branches are going to the country banks with dealers and some of these visits have resulted in a distinct loosening of money and a consequent resumption of the natural flow of merchandise. Other calls of this sort have proved fruitless, but the distributors are showing a disposition to repeat them in territories where relief is still denied and there is indication that persistence will bring about a gradual improvement in the situation.

The falling off in demand has brought some peculiar conditions into being. A

dealer in two cars, one selling around \$2000 and the other around \$1000, finds the higher priced article in greater demand, which is exactly contrary to his anticipations. He accounts for it in the assumption that persons intending to buy \$3000 or \$4000 cars have found their incomes curtailed by the general business slump and have turned to the \$2000 job. On the other hand, intending buyers of \$1500 to \$2000 cars, suffering from the same financial ailment, apparently, are not content to take a \$1000 job, and go without a car, while the ordinary \$1000 purchasers are fewer than the prospect lists indicated as a result of sub-normal conditions.

A few makes of cars, which a short time ago were said to be, "sold up to 1921," can be had on immediate delivery, which indicates that order lists were padded with names of persons who, until their pocketbooks were cramped, were shopping around "anywhere to get a car."

### Salesmen Getting on the Job

In New York city salesrooms, where a few weeks ago, half a dozen or more salesmen could be seen standing around, are deserted now by everybody but the executives and the office force. The salesmen haven't quit—most of the dealers are keeping up and expect to retain their staffs—but they are out working the territory. Most of the cars that leave salesrooms now have been sold, not bought.

Enclosed cars are meeting sales resistance because of their cost and, particularly in the smaller communities, because of the opposition of bankers. Some of the latter are openly discouraging dealers desiring credit to stock enclosed cars, telling them that they should take touring cars to get faster turnover on their money. Distributors have come forward with the argument of the general utility and the all-year-round market of the enclosed vehicle, which has had some effect here and there.

The demand for used cars is poor and the oil and gas price increases, having a discouraging effect on touring, have brought about a slowing up of tire and accessory sales.

### PACIFIC COAST OUTLOOK BETTER

San Francisco, July 21—The entire situation in the Pacific Coast automobile industry seems to have greatly improved within the last week or ten days. Where a fortnight ago, there was considerable uncertainty in every phase of the business, now things have clarified, so that every distributor and dealer has a pretty clear idea as to how things stand and how they are going to move.

The worst of the slump seems to be over, and there is a decidedly normal tone to the whole automobile market, with prospects of a very satisfactory fall.

However, with the freight situation, nationally, not yet clarified and with the consequent production tie-up continued, there is little prospect of any drop in automobile prices.

## New England Dealers See Return to Normal Business

**Present Trading Sound but Public's  
Extravagant Buying Spree Is  
Gradually Abating**

BOSTON, July 20—Approach of more normal times is being sensed here by a seasonal slowing up.

For the first time in almost two years the dealers appreciate that they must sell cars rather than merely take orders for them. The slackening has been sufficient to cause many of the dealers to consider the situation carefully and to take account of stock. Those who have done this are very well satisfied with what they found; that there is nothing fundamentally wrong with the industry or with the local trade. There is no overstock of vehicles, either cars or trucks, and the factories are not in a position that indicates that there will be an over-supply right away, sufficient to break the market. The trade situation is basically sound. Simply the period of the public's extravagant buying is passing. A more business like era is coming.

### Seasonal Influence Good Sign

Before the warm midsummer, buying was always quiet. Last year, the rush of buying continued unabated straight through the summer and some seem to have been expecting that the same sort of thing would go on this year. It has not and it is a good sign of the approach of more normal times that the seasonal influence is exerting itself.

Early buying this year was forced, too, for fear there would not be enough motor vehicles to go around. Then again, and this applies to New England where the credit situation is so different, banks have shown no disposition whatever to be drastic in their business with motor vehicle dealers. At least that is according to Boston distributors of cars and trucks.

Money costs more than it did and the bankers are conservative in extending loans, but nothing has developed so far to indicate that anywhere in the northeast part of the United States the banks are failing to finance in a legitimate way the buying of motor cars and trucks. One of the largest distributors in Boston states that he has received no complaint from any dealer of unwillingness on the part of a bank to extend accommodations on motor vehicles.

The demand for trucks has eased up considerably, due in part to seasonal influences and in part to general business conditions.

### DES MOINES SHOW AUG. 25-SEPT. 3

Des Moines, Ia., July 19—Des Moines automotive dealers are making preparations for the annual fall show which is held each year in connection with the Iowa state fair. The fair will be held this year August 25 to Sept. 3 and a majority of the dealers will have displays.



## Kansas City Tractor Club Investigates Bank Motives

**Finds That When Credit Has Been  
Denied Action Was Due to  
Violation of Rules**

KANSAS CITY, July 19—An investigation conducted by the Kansas City Tractor Club has disclosed that when the Federal Reserve bank of this district has refused to rediscount tractor and other farm machinery paper it has not been due to the character of the paper. What has been characterized as discrimination against this class of security has been due rather to violation of the rules of the Federal Reserve system and the regulations pertaining to agricultural paper. Notes of this kind are discounted when presented and endorsed by a member bank.

The facts are that small state banks, not members of the Federal Reserve system, have passed their loans on to banks which are members and these banks in turn have had this paper recognized in the loans of the Federal Reserve bank, which is absolutely contrary to the Federal Reserve act, showing that the bank in this district has been as lenient as possible with these state banks in the past.

In a time of credit stringency like the present, however, the Federal Reserve feels that all its credit resources should be devoted to its own members and as a consequence, these small banks have lost their most powerful financial assistance. If they were to come into the Federal Reserve system their loaning capacity would be increased two and one-half times. If they were to enter it, however, they would lose some sources of revenue which they now enjoy.

The only tractor and farm machinery paper which the Kansas City bank has refused to honor is that which has been endorsed by these banks and turned over by them to member banks in violation of the provisions of the Federal Reserve act.

## PURITAN BUYS RUTENBER SERVICE

Detroit, July 19—The Puritan Machine Co., Detroit, has purchased from the Rutenber Motor Co., of Marion, Ind., the complete service business covering all engines formerly manufactured by them, with the exception of current model 25—now in production. All parts, tools, jigs, blue prints, etc., are being moved to the main plant of the Puritan Machine Co., at Detroit, from which point all service parts will be distributed in the near future.

## WINCHESTER SELLS ACCESSORIES

New Haven, Conn., July 17—The Winchester Repeating Arms Co. announced that it does not intend at present to go into the manufacture of automobile accessories, although accessory departments will be conducted in all the Winchester stores throughout the country. The stocks which will be carried will be

purchased in the open market and sold at the regular prices.

The Winchester company will have exclusive stores of its own in all cities of 50,000 population or more, which will serve as distributing centers and warehouses will be operated in connection with them. In the smaller places some hardware dealer already established will be appointed the Winchester dealer and his store will be recognized as the Winchester store. He will carry a complete stock of the Winchester products and also will have an automobile accessory department. An elaborate merchandising system has been worked out and each dealer will have all the assistance it is possible for the company to give.

The Winchester company contends that no hardware store can be complete without a line of automobile accessories and that is the reason they will be stocked by the Winchester dealers.

## FORD VICTOR IN DREDGING SUIT

Detroit, July 19—The United States Circuit Court of Appeals has affirmed the lower court in refusing to enjoin the dredging of River Rouge on application of the American Agricultural Chemical Co., and other interests. The decision is a distinct victory for the Ford Motor Co., and in fact, the chief allegation in the petition for injunction was that the proposed improvement would be injurious to the property along the river and of benefit solely to the Ford Motor Co.

Plans now are being formulated at River Rouge plant for vast extensions to the blast furnaces and it is said to be the idea of the Ford Motor Co., to produce all of the steel required in the manufacture of its products eventually. At present, chief efforts at the Rouge plant are being centered in the manufacture of closed bodies.

## GREAT SCOTT VAPORIZED ENJOINED

Grand Rapids, Mich., July 19—An injunction has been granted on application of the Corbett-Vanden Bos Carbureter Co., restraining the Great Scott Vaporizer Co., from manufacturing and selling a carbureter known as the Great Scott Vaporizer. The plaintiffs claim patents on the carbureter which were perfected by C. A. Corbett and John Vanden Bos belong to the plaintiff company. An agreement for royalties on a similar carbureter, the petition alleges, has never been carried out.

## TAKE OVER GARDNER BUSINESS

New York, July 20—A company has been incorporated in this state to take over the business, assets and good will of the Gardner Motor Car Co. of St. Louis. It will have an authorized capitalization of 300,000 shares of no par value of which 155,000 shares will be issued.

The president of the new company will be Russell E. Gardner, former head of the Banner Buggy Co. and organizer of the Chevrolet Motor Co. of St. Louis.

More than 3,000 cars have been produced since Jan. 1 and the estimated production for this month is 1,000 cars.

## Coast Truck Credit Hindered By Heavy Crop Financing

**Bankers Have Loaned So Much to  
Farmers On Market Possibilities  
That Money Is Scarce**

LOS ANGELES, July 20—Motor vehicle distributors with headquarters here, who are represented at various points west of the Rocky Mountains, declare the financial situation as it relates to motor cars and trucks is very bad. Banks will not make loans to automotive dealers and, it is reported, that they even are discouraging buyers against withdrawing funds from the banks with which to pay for cars or trucks. Protest after protest has been lodged but all are unavailing. Interest rates have been advanced but even for those who are willing to pay the top price money is very hard to get. The situation in Los Angeles proper is not as bad as in the outlying country.

The most likely way to account for the present condition is one which the banks are not telling about publicly. It is that the banks have loaned so heavily to farmers on crop prospects that they have no money for other purposes. An Imperial Valley dealer stated a few days ago, when the Colorado River threatened to flood a large section of the valley, and ruin the cotton crop, the loss would wreck four banks in the valley. This dealer was a bank director, too. To date, the flood waters have been fought back successfully but apprehension remains.

A western truck distributor has been notified by representatives in Colorado, Utah and Wyoming that it is absolutely impossible to get the banks to finance truck deals. Moreover, the banks are charged with having loaned to ranchers funds deposited by truck dealers themselves and when the latter seek to get their own money to assist in financing truck buyers, obstacles are placed in their way. In Wyoming, it is claimed, banks have loaned money to stock raisers at a calculation on the prices of meat in excess of market quotations, the negotiations for the loans having been based on higher prices than now prevail.

## \*ADD TRUCK DELIVERIES

Seattle, Wash., July 10—Definite plans have been made for the inauguration of regular truck delivery services from Seattle to Bellingham, Aberdeen and other points within a radius of 125 miles of Seattle.

Construction has been started by one company on a modern fire-proof motor freight depot. The new building will be of reinforced concrete construction and will represent an investment of about \$150,000. The building will be two stories in height with a foundation strong enough to carry two additional stories. The builders are so confident that the "ship by truck" movement will extend with such rapidity that the plans were made in the building plans for the additional stories.

## Motor Trucks Doing Big Work in Southwest Wheat Fields

Each Truck Carries About Seventy Bushels and Makes Three to Four Hauls a Day

KANSAS CITY, July 20—The motor truck is helping materially in the present harvest in the Southwest. Though the freight car shortage is still great in the Southwest, the motor truck is relieving the local strain by handling short haul shipments. It is easing the transportation situation in the wheat belt by bringing the grain from the fields to the smaller elevators and from there to the city terminals. Fleets of trucks are following the threshing from field to field and helping in removing the grain from thresher to storage. Approximately 200 trucks are now engaged in this service in Kansas and Oklahoma, many owned by individual farmers, others by thresher men. Each truck will carry from sixty-five to eighty bushels on a haul; each haul averaging nine miles, and makes from three to four hauls a day. As each truck carries the load of several teams, there is no congestion at the elevators or waiting for unloading. The conditions of the roads prevent the increase in length of haul in some localities. Many business men here were of the opinion that the truck would play a big part in relieving the car shortage in the Southwest. The field of profitable motor truck shipping is limited to a forty mile radius. Due to the poor roads and the weight of the loads, shipments of grain by truck from the wheat belt to the eastern markets is impractical. A loaded truck standing overnight, weighs down the springs, allowing no relief from the strain and giving no opportunity for mechanical work. The sphere of the truck haul lies in a daily round trip from its terminal city.

### FOX RIVER TRACTOR READY

Appleton, Wis., July 19—The Fox River Tractor Co., a \$200,000 corporation organized here about twelve months ago, has completed its experimental work and is preparing to engage in quantity production of its new gas and kerosene tractor. A feature of the machine is the three-speed transmission, instead of the usual two-speeds, and the generous use of steel parts, instead of castings. The gearset provides a road speed, plowing speed, and a third for clay or gumbo plowing, the range being from 1 1/4 to 4 m.p.h. The original factory, 40 by 75 ft., is now being enlarged, and plans made for a main factory unit, 60 by 200 ft., to be erected late this fall.

### TRUCKS KEEP UP SALES CURVE

Milwaukee, July 19—"Immediate delivery" are two words which are making their reappearance in dealer advertisements for the first time in nearly two years. It is indicative of a relatively

larger supply of passenger cars. This is the result of a number of circumstances, chiefly, a less pressing demand in general and the success of dealers in catching up with back orders. There are, however, many dealers who not only have not cleaned up old business, but are not yet getting cars in adequate supply. Since most dealers have motor truck selling connections, which have been pushed to an extraordinary degree in recent months in view of the handicaps surrounding the passenger car market, they are able to maintain and exceed former volume in many cases.

### MANUFACTURE NEW ENGINE DEVICE

Milwaukee, Wis., July 12—The American Valve Rotator Co., a new Milwaukee corporation with a capitalization of \$100,000, will engage in the manufacture of a newly patented device for application to internal combustion engines, by means of which poppet valves are rotated in their seats with each revolution to gain a theoretically correct system of operation. The invention has been perfected at the plant of the Waukesha Motor Co., Waukesha, Wis., with the assistance of H. L. Horning, president and chief engineer, during the past six months.

### SHIP TRUCKS ON RIVER

Memphis, Tenn., July 19—A barge load of motor trucks from the White Co. of Cleveland consigned to the Memphis branch, arrived this week via the Mississippi river. There were sixty-nine trucks on the barge shipped from Pittsburgh.

### INSPECT ROLLS-ROYCE PLANT

Springfield, Mass., July 20—Claude Johnson, managing director of Rolls-Royce, Ltd., and chairman of the American works at Springfield, Mass., arrived from England a few days ago in connection with the building of the Rolls-Royce car, which is proceeding under strict English supervision. Mr. Johnson came here to make a final inspection of the American works in advance of starting production, which is scheduled soon.

## Bankers Say Eighteen Months for Time Payment Too Long

Would Limit Period On Trucks to Within One Year. Dealers Meet to Fight the Plan

LOS ANGELES, July 20—At a meeting of a committee representing the motor truck dealers of the city, it was decided to seek to enlighten banks and funding companies upon the subject of motor truck loans. The financial institutions have been complaining against the eighteen months period allowed by some truck dealers for payments. They claim this time is too long and are seeking to bring influence to bear on the dealers so that the trucks will have to be paid for within a period of one year from date of sale.

It is the intention of the truck representatives to try and educate the funding companies. It will be sought to show that buyers of motor trucks, in almost every instance, expect to pay for the truck out of its earnings. This applies to big commercial companies as well as the individual buyers. Truck dealers say that instead of seeking to shorten the time payments, the banks should be more willing to extend them, as by that method they can more reasonably expect the purchaser to complete the payment for his truck.

There are one or two truck concerns that are so well financed that the banks solicit their paper even in the face of existing circumstances. With the strings being tightened upon others, these favored concerns would reap a whirlwind in sales were they able to get the trucks. Sales floors are entirely vacant, while other lines, able to meet the demand, are not finding a similar demand.

### CARBURETER IN PRODUCTION SOON

Detroit, Mich., July 20—Dave Buick announces that his new plant at Wyandotte, Mich., for the production of the Dave Buick carbureters, will be in operation within sixty days.



Instead of packing up their household equipment in California, they block up the house, put rollers under it, call in a motor truck man and away they go, house and all, without any serious interruption in the regular housekeeping. The bungalow in this picture weighs about 20 tons and is being driven by an Armleder 5 1/2-ton chassis. It took about an hour to move the house six blocks to its new location.



## "Trucktown" to Be Feature of Wisconsin Motor Show

### Five Acre Tract Laid Out to Represent Ideal Village Completely Motorized

MILWAUKEE, WIS., July 19—To take the best possible advantage of the opportunities afforded by an exposition like the Wisconsin State Fair to drive home the motor truck idea as a farm utility, the Milwaukee Automotive Dealers association has laid plans for activities at this year's fair, to be held Aug. 30 to Sept. 4, which will stress the commercial vehicle as never before.

Five acre tract adjacent to the passenger car show building, located in the southwest corner of State Fair park, has been leased by the association and will be used as the site of "Trucktown," a new idea in motor truck merchandising effort.

The Trucktown idea is the result of recognition of the necessity of exhibiting trucks to the farmers of Wisconsin during the State Fair, under the most advantageous demonstration methods. It is believed to be a brand new idea and one which doubtless will be copied widely after its success has been demonstrated next month.

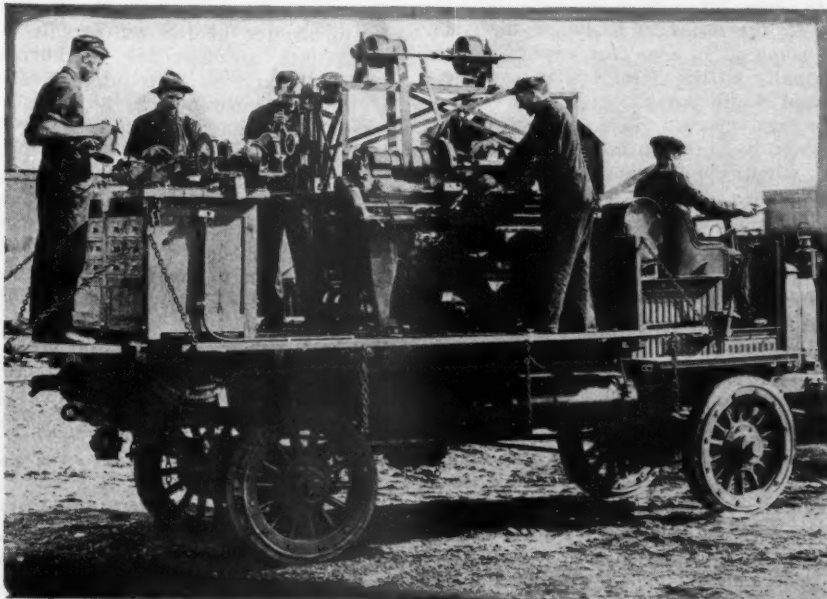
The five-acre tract will be laid out as an ideal village, and will be conducted along municipal lines, with its own mayor, police and fire department, street commissioner and other factors of control and protection. It will be equipped

with motor trucks, general haulage tractors, trailers and other devices useful on the farm in connection with the transportation of agricultural products to the market.

The space will be laid out in streets, walks and lots, the last-named being for exhibition purposes. A motor bus line will operate from the main gate to the village, and in itself will be a demonstration of efficient transportation methods in small communities with no electric railway facilities. There will be a demonstration ring at the south end of the village. It will be the distinct feature of Trucktown and will be used for loading and unloading demonstrations, exhibitions of hoists and loaders, removing empty bodies and replacing loaded bodies on chassis; comparison between loads of horse-drawn and motor vehicles and numerous other features. Close by the demonstration ring will be a black tent for motion picture exhibitions of an educational character.

### STEWART TRAILER IN PRODUCTION

Waupaca, Wis., July 19—The Stewart Tractor Co. of Waupaca, Wis., has developed a new type of trailer designed especially for combination with tractors and the first vehicles are now coming through the works. The Stewart trailer is built with drawbars fore and aft, so that they may be used singly or in trains. The coupling is of special design to provide automatic trailage for trains making curves. The new trailer will be manufactured in quantities, and offered to the trade in combination with the Stewart tractor or individually.



Portable repair shops, mounted on motor trucks, were extensively used by the government during the war to care for its large fleets of trucks. Mounted on the chassis is complete equipment to handle any kind of repair job. A separate engine furnished the power for operating the various machine tools. This embraces such mechanical apparatus as a drill-press, screw cutting lathe, electric grinder, blow-torch, welding outfit, forge and more than 1000 other pieces of machinery and tools. Each tool and piece of machinery has its own location, insuring compactness when the end and side panels are up and the truck is in motion.

## Motor Truck Offers Strong Competition to the Railroads

### Head of Steel Business Cites Instance Where Half of June Output Was Shipped by Truck

WASHINGTON, July 20—The vital dependence of all industries upon motor transportation when the railroads fail in their mission, was strikingly illustrated in the testimony of representative witnesses at the hearings before the Interstate Commerce Commission recently on the question of distribution of open-top cars. It was clearly demonstrated to the Commission that the motor truck was becoming more competitive than supplementary to the railroads. These facts were given in refutation of the charges that the automotive industry was more or less non-essential.

While the shippers of automotive products made no official representations at the hearing, the attacks upon the industry as a whole became so virulent and without foundation in fact that M. O. Eldridge, of the American Automobile Association, took the stand to set the Commission clear on the subject. He refuted the statements of several witnesses that the automobile was solely a pleasure vehicle. He cited statistics to show that only a small percentage of automobiles are used exclusively for pleasure purposes. Reference was made to the Pullman and passenger cars on the railroads. Eldridge said that fully ten per cent of the passengers who ride on the railroad trains are not riding on account of business, but merely for pleasure. It was his contention, that of the seven and one-half million automobiles in use, it would be difficult to find more than ten per cent which are operated for pleasure. He mentioned the fact that the dealers' records show sixty per cent of the cars which are now being sold are purchased by farmers.

As to the practical utility of motor trucks, Eldridge referred the Commission to the testimony before the Senate committee in which it was stated that 1,200,000,000 tons of freight were carried over the highways by the 750,000 trucks owned and operated throughout the country. He insisted that trucks were essential to the movement of coal, road materials and food products.

W. S. Guy, traffic manager, Carnegie Steel Co., told of the dependence of the steel industry on the motor truck as a means of transportation. He cited an instance in one plant which manufactured 49,000 tons of material in June and shipped 29,000 tons by truck. He called attention to the fact that it is the small customers that suffer when the railroads prove inefficient, inasmuch as their more powerful competitors, by purchases of fleets of trucks are in a better position to meet the emergency. The Duquesne plants of the Carnegie Steel Co. have been trucking over fifty per cent of their output.

## Return to Normal Business Hinges On Transportation

### Enormous Credit Tied Up In Crops Pending Their Movement to the Markets

NEW YORK, July 20—A slight easing in the tense credit situation has been apparent in all sections of the country for the past ten days but there is no reason why it should be hailed as a harbinger of the "all clear" sign for the automotive industry. It simply means that attempts at deflation are meeting with success and that with the curtailment of loans for speculative and profiteering purposes, more funds are available for legitimate business.

One of the most encouraging signs of the times is that the readjustment of business has been brought about with so little disruption. There have been a few financial cracks here and there but nothing which in any way resembled any crash and business engineers are beginning to breathe more easily. They are hopeful that the country can be restored to a condition resembling normal without any really serious disturbance.

There has been a disposition in some quarters to impute to the Federal Reserve Board and the member banks selfish motives in restricting credit. The assertion is frequently made that their purpose was to raise interest rates and thereby enhance their profits. There seems no real basis for this condition, at least so far as the Federal Reserve is concerned.

### Reserves Must Be Kept Up

Since the inception of the Federal Reserve system it has been an axiom that if the reserves were to fall below 40 per cent of the total liabilities, the danger point would have been reached. To go below this point, it was held, would not be consistent with banking caution. In January, 1919, the reserve percentage was 51.2. In January last, it had fallen to 43.7. In February it had crept up to 44.1 but in March it had slumped to 42.6.

It was then that the board began to take drastic action to bring about liquidation, but in spite of the efforts which it has made the first report for July showed a reserve of only 42.8. It has not been above 42 and a fraction since February. At the time of the armistice it was a fraction above 50. It is apparent, therefore, that there can be no great loosening of credit until the reserves reach a considerably higher level. The figures given are for the entire system and vary in the different districts. Reserves in the New York district which is the cornerstone of the whole, have been down slightly below 39 per cent.

It must be remembered that enormous sums will be needed to finance the crops which are beginning to come into the market now. The peak of this burden will not be needed until fall. The credit situation is bound up so intimately with

transportation that it is difficult to separate the two.

A large part of last year's crops has not been moved because of the car shortage. Farmers have been warned that they must prepare to store much of this year's crop themselves because of the shortage of warehouse space resulting from the lack of cars. This means that the farmers must be financed, pending sale of their produce.

A vast amount of credit which might otherwise be liquid, will be tied up for this reason. Inability to market crops will have a tendency to hold up food prices and until food prices drop, the cost of living cannot be restored to a normal and stable basis. Until that is done there can be no stabilization of business or industry.

No gift of prophecy is required to see that no matter how much credit is available and no matter how auspicious other conditions may be, there can be no permanent stabilization until the shortage of transportation is relieved. The carriers can afford no great relief until they get additional equipment. They will be unable to materially enlarge their supply of rolling stock before spring.

The final analysis means that from now until spring the railroads will be forced to bend all their energies to the movement of food and fuel and that they can handle only a fraction of the general business which will be offered them.

### FORDSON ASSEMBLY PLANT READY

New York, July 19—Assembly of Fordson tractors has commenced at the Ford assembly plant at Kearny, N. J., at the rate of seventy-five daily.

Of the machines made up here, two-thirds are for domestic consumption, going to the Atlantic seaboard districts. The remainder are for export, going principally to the West Indies and Central and South America.

The Ford company is expecting a heavy European business on tractors, as well as cars, when conditions in Eastern and Southeastern Europe becomes more settled, and when trading with Russia becomes possible again and the plant at Cork, Ireland, will be called upon—with the one at Copenhagen for cars and trucks—to supply that business.

### R. & V. KNIGHT FOUR READY SOON

Detroit, July 20—R. and V. Knight Four soon will be lined up along side the Six, according to information reaching Thomas H. Walker, general manager of Knight Motors, Inc., from the factory of the Root & Vandervoort Engineering Co., Moline, Ill. Production of the Four has been delayed on account of the demand for Sixes and deliveries of the Four are expected by September 1. The lines of the four-cylinder car will follow closely those of the larger one.

### COLUMBUS TRACTOR DATE CHOSEN

The Columbus Tractor and Implement Club has chosen the second week in February, 1921, for the Columbus Tractor Show. The show will begin Monday, Feb. 7, and close Saturday, Feb. 12.

## Figures Show Automobile To Be Essential Industry

### More Than 2,000,000 Automobiles Are Used by Farmers—One Car Displaces Five Horses

ATLANTA, Ga., July 22—The attitude of Governor Wellborn, of the Federal Reserve Bank, of Atlanta, in declaring that the automobile business was non-essential and that the automobile was a luxury, and, therefore, adopting a policy for the Federal Reserve system greatly curtailing credit in the sale of automobiles, was bitterly assailed in a statement published in various Southern newspapers by Jackson H. Simms, who is well known in the automobile industry throughout the South.

In support of his viewpoint that the automobile business is highly beneficial to the nation, the following statistics were included by Mr. Simms in his statement:

The automobile industry has invested in it a total capital of \$1,297,000,000, which is \$250,000,000 greater than the capitalization of all the National banks, which, in 1917, was \$1,079,699,999; that the wages paid by the automobile industry amount to an excess of \$747,000,000, which is two and one-fourth times as great as the total revenue of the post office department, which, in 1917, was \$229,726,116.

Mr. Simms called attention to the fact that more than 2,000,000 automobiles are used by farmers. The economic advantage of the automobile over the horse is pointed out by his statement that the disappearance of the automobile would necessitate an increase in horses by 25,000,000, and as it requires five acres of land to keep one horse, this would mean 125,000,000 acres of land for horse maintenance.

Mr. Simms stated that investigation has shown the majority of bankers realize the automobile industry is vitally essential to the nation, and their opinion therefore does not coincide with that the governor of the Federal Reserve Bank of Atlanta. He declared that had Governor Wellborn taken the time and trouble to acquaint himself with the real facts concerning the automobile industry, he would never have made so reckless a statement.

### OPEN L. A. SERVICE STATION

Los Angeles, Cal., July 19—Factory service headquarters for the Standard Eight for the entire Pacific coast are to be established in Los Angeles in the quarters of the Standard Steel Automotive Corp. Whether the census reports showing Los Angeles to be the largest city on the Pacific coast had anything to do with the factory's decision is not stated.

It will mean the location here of a huge parts stock, capable of supplying the needs of the entire Pacific coast, and inland as far as Salt Lake City, Utah.



## Syracuse Automobile Dealers to Form Service Association

### Need of Close Cooperation Between Dealer Body and Service Organ- ization Pointed Out

SYRACUSE, N. Y., July 19—Realizing the increasing importance that service plays in the sale of cars, the Syracuse Automobile Dealers association held a meeting at Three Rivers. The object of the meeting was to discuss the advisability of having the service managers form an association similar to service associations which have been recently started in other parts of the country.

About forty men attended, approximately half of these being dealers and the other half dealers' service managers. J. W. Lee, Jr., president of the association, presided at the meeting. Lee, after briefly commenting on the lack of co-operation which has always existed between the various service departments in Syracuse, introduced J. Howard Pile, secretary and general manager of the Automotive Service association in New York and Technical Editor of Motor World. Pile related briefly, the advantages to be derived from the formation of a service association and told what had been accomplished by other associations in different parts of the country. "For a great many years," he said, "the automobile industry has been chiefly concerned with the manufacturing and selling of automobiles, and it was not until very recently that the third branch of the industry, service, has had any very considerable amount of attention. The problem of national or local associations was gone into at some length, and the formation of a national association at this time was considered out of the question, because the local service man is concerned with strictly local problems. The local service man's problems are labor, competition in price and in quality of work, and in keeping the owner satisfied. Therefore, what will interest a man in San Francisco, may be of no interest whatever to a man in Syracuse, and there would seem to be no real function that a national association would perform. A local association, on the other hand, can do much good in getting the service executives acquainted with one another and promoting the general welfare of the association end of the business."

The need for close co-operation between service and dealer associations was emphasized. In some cases, service associations which were formed without the sanction of the dealer associations have met with considerable trouble, and it has been necessary to convince the dealer associations that the organizations were of up-lift character, because, somehow or other, the mistaken idea had crept in that they were able to be on the order of labor unions. At the conclusion of Mr. Pile's talk it was moved, seconded and carried unanimously that

Syracuse immediately take steps in the formation of a service association following as nearly as possible the lines laid down by the associations of Brooklyn, Newark and New York. Accordingly, a committee of five service men was appointed.

At the present time the activities of the dealers' association are confined largely to authorized representatives of passenger cars. Plans are under way to enlarge the scope of the association and include service executives of not only all passenger car dealers, but truck dealers as well.

### FORM MINN'POLIS BATTERY ASSN.

Minneapolis, July 19—Leading battery firms of Minneapolis have formed the Minneapolis Storage Battery association. Eighteen chartered members are on the

**G**ASOLINE hoarding has become an art in California. Few the motorists who have no five gallon cans, extra tanks or similar means of draining off the three gallon limits sold at the service stations, so more can be secured for long trips.

But the man who appeared at a service station near the municipal camp ground here had the last word in gasoline tanks. He came once too often to the station for a supply, and was investigated. He was found to have tanks on his running boards, under his cowl, under the hood, hung from the back, under his seats and elsewhere with an aggregate capacity of 75 gallons.

There is, of course, no penalty for this, but he was refused more gasoline at that station.

membership roll and ten more intend joining.

The organization arose from the discovery of a need to root out some business abuses which had crept in from lack of association among the battery station men. It was found in some instances that charges were being made through ignorance, at less than actual cost, without consideration of labor and overhead expenses.

After working out a table of repairs based on costs, labor and overhead, the association has issued the following table as a guide to dealers who wish to know where they are at:

### REINSULATION

Five plates, 6 volt, \$6.25. Seven plates, 6 volt, \$6.89; 12 volt, \$11.37. Nine plates, 6 volt, \$8.12; 12 volt, \$12.21. Eleven plates, 6 volt, \$9.50; 12 volt, \$14.05. Thirteen plates, 6 volt, \$9.98; 12 volt, \$15.04. Fifteen plates, 6 volts, \$10.46. Seventeen plates, 6 volt, \$11.09. Nineteen plates, 6 volt, \$11.57. Twenty-one plates, 6 volt, \$12.09.

Replacement parts charged at current catalog prices.

One dollar charge for batteries called for and delivered in city limits. Extra charge for removing and installing batteries where time required exceeds 30 minutes. Labor charge \$1.50 an hour.

## Unable to Explain Shortage of Gasoline in California

### Not to Be Had at Any Price in Some Localities. Two Gallons Usual Limit

LOS ANGELES, July 20—The gasoline-less day has arrived. It has passed entirely beyond the rationing stage in some localities. To-day, in Santa Barbara, there was no gasoline to be had at any price. In San Bernardino the only stations having any kind of a supply were those of the Standard Oil Co., and they were parceling out the allotments. In Los Angeles the supply is so limited that purchasers have to go from one station to another trying to get enough to operate on. The manager of an oil company told a big customer that his concern would be unable to supply the customer's needs and advised him to seek elsewhere.

If this condition continues for several days it will mean the worst transportation tieup this part of the country ever has experienced. The railroads have been unable to supply enough cars in some localities and motor trucks have been operating day and night to help relieve the situation. In the Imperial Valley country melon growers have suffered a great loss because of lack of cars and the same applies as to onions in another section. Motor trucks were called upon for long distance hauling in the attempt to get a portion of these crops to the seaboard at this point. Distillate was withdrawn from the market several months ago and now the gasoline shortage has begun to stop truck operation.

Thousands of motorists were stalled in remote localities over the Fourth of July holidays, because of the gasoline shortage. Garage owners and filling station agents established two gallons as the customary limit. If the car's tank had enough to get to the next town, the driver was refused any addition. It is not a question of price. Practically no reports have been made of excessive charges for fuel. The gasoline is not to be had. The producers say the demand exceeds the supply and the reserve stock is exhausted. Consumers maintain there is an absence of effort to make the supply sufficient. Nobody seems able to present a true explanation.

### HALF HOLIDAY ON SATURDAY

Los Angeles, July 20—The Los Angeles Motor Car Dealers association has decided to close for Saturday half-holidays during the months of July, August and September. The motion that was passed at a recent meeting provided that all member establishments should close "tight," but some of the truck dealers took the position that they could not close their service departments at a time when so many trucks were in operation. The truck dealers, therefore, were permitted to govern their business in conformity with individual judgment.

## Collecting Kentucky Fuel Tax Presents a Problem

### Efforts Made to Avoid Tax By Disguising Gasoline Under Another Name

LOUISVILLE, KY., July 19—Satisfactory solution of problems involved in collecting the tax of one cent a gallon on gasoline sold at retail has been reached at a conference with wholesalers in the office of the State Tax Commission.

After August 1, the tax will be paid by wholesalers to county clerks of counties in which sales are made by them, although the retailers must continue under the law to make itemized statements to the clerks of their sales. Until that date the state will have to collect the tax from retailers as best as it may.

It was estimated at the conference that not half of the garage men, country storekeepers, druggists and other handlers of gasoline are reporting. One wholesaler stated that many of his customers said they would quit handling gasoline rather than go to the trouble and expense of keeping check on the tax.

Efforts to avoid the tax by disguising gasoline under some other name were discussed, and the wholesalers promised the commission co-operation in exposing them. One concern since the law was passed has dropped gasoline for a substitute and will refuse to pay the tax.

Attorney General Charles I. Dawson holds that if the substitute is based on a petroleum product and added ingredients do not change its essential character as gasoline it still was subject to the tax.

The State road fund, wholesalers, retailers and county clerks, it was agreed at the conference, will be benefited by collection of the tax from retailers. With some 8,000 small dealers to collect from the possibilities of getting all the money due the state was small and would have necessitated employment of a large number of inspectors.

Most small dealers do not keep books in a way accurately to distinguish this and county clerks would not be compensated by the 1 per cent commission for the work of checking entailed, even if they could do the work.

With the wholesalers reporting total sales in a county and retailers reporting their sales in detail the Tax Commission will have a double check on the \$450,000 revenue the tax is expected to produce annually.

### ONTARIO HAS ANTI-GLARE LAW

Toronto, Ont., July 19—The new Ontario anti-glare headlight law goes into effect July 19th. The motor vehicles of the province must have the headlights equipped with approved anti-glare lenses or devices by that date. The law will be vigorously enforced. A penalty of from ten to fifty dollars is provided in case of non-compliance. The government

is determined that within a short period of time every motor vehicle shall be equipped with approved non-glaring devices. Prof. Lang, Secretary of the Faculty of Applied Science and Engineering, University of Toronto, is conducting the tests for the government. All wishing to have their devices tested should forward them immediately to the Department of Highways, Parliament Buildings, Toronto, with a twenty-five dollar test fee. An additional fee of twenty-five dollars is imposed for the issuance of certificates of test. The tests referred to, of course, only are of interest to manufacturers, dealers and distributors of anti-glare lenses and devices.

### LAP PRIZES FOR BEVERLY RACE

Los Angeles, July 17—There is every indication that the lap prize feature that was introduced for the first time at the Indianapolis speedway this year will be adopted for the 250-mile Thanksgiving Day classic, which will conclude the racing season on the board track at Beverly Hills. Owing to the fact that the laps on the local course are but one-half the length of those at Indianapolis, the award will be \$50 per lap instead of \$100. The Motor Car Dealers association and several civic organizations have approved the idea and expressed a willingness to help raise the subscriptions. The holiday race will be the last one of the year that will be included in the determination of the drivers' championship. Unless the matter is decided by that time, this means every driver with any chance at the honor will appear here. The announced purse for the race is \$25,000.

### CREDIT BETTER AFTER HARVEST

Sacramento, Calif., July 20—The financial situation, coupled with the gasoline shortage, has made business conditions along automobile row in Sacramento far from ideal in the last weeks. Bankers still refuse the automobile paper, and until after the crops are harvested, there is little hope for any reversal in the matter.

The gasoline shortage has made the hesitant buyer decide to wait until conditions settle, and dealers are catching up on their orders for the first time in two years. Added to this, the fact that banks will not carry paper, puts it upon the dealer to carry the contracts himself or to find private financial aid. In some cases, this can be done, but it has proved more costly and troublesome, and some dealers refuse to sell on that basis.

With the harvest ended, however, it is believed the banks will again begin to get their money back from the farms and that the automobile security will be good for the loans to handle business as in the past. Here, notes given on purchase of cars bear eight per cent, and when discounted for from two to four per cent more, make good investments. Added to that, the fact that few contracts fail, the security thus proving good, the theory that the banks are anxious to carry the paper as soon as they can, is given weight.

## Elgin Road Race To Be Held Aug. 14, Instead of Aug. 21

### Date Changed to Allow Drivers to Prepare for Uniontown Race Labor Day

CHICAGO, ILL., July 20—Great progress has been made in preparing the road for the Elgin automobile road race, which is to take place on the old course August 14, instead of August 21, as previously announced.

The advance in the date is to accommodate the racing men, so they may have ample time to fix up their mounts after the Elgin and not be delayed in getting to the Uniontown speedway for the Labor day meet there.

As soon as the dragging of the south leg is completed 30,000 gallons of road oil will be spread over the surface of the eight-mile course and then the drags will be kept going to smooth out every little wrinkle. At the same time every stone of any size will be raked off. Then a week prior to the race another 10,000 gallons of oil will be spread on lightly to act as a dust layer.

The first nomination received by Director Root came from Cliff Durant, who will drive his new Chevrolet special.

Three of the Duesenberg team have been entered by Fred S. Duesenberg. Tommy Milton, Jimmy Murphy and Eddie O'Donnel, will all be at Elgin and will pilot eight-cylindered Duesenberg specials.

It was Murphy who took major honors at the opening of the Los Angeles speedway and piled to his credit the first of the championship points.

Milton and Murphy, it will be remembered, ran a neck and neck race in the 500-mile race at Indianapolis and all but came in one-two. Milton was the star at Uniontown and again on July 5, at the Tacoma speedway, while Eddie O'Donnel has been well up in the money.

Nobody doubts that the Dueses will go away with a goodly share of the \$15,000 offered in prizes and the honors which accrue to the victor.

### NO LOUISIANA ROAD WORK

Baton Rouge, La., July 19—It is becoming more apparent day by day that there will be no good roads legislation at this session of the Louisiana legislature, and that both the Milner and Dowling bills will go over without action until the constitutional convention in February, when they will be incorporated in the new state constitution. This was forecast by the correspondent some weeks ago, but there was a movement the last week in June to bring up both bills, and let the legislature decide which one it wanted, but so much other and more necessary legislation appeared to be cleaned up that these two bills were sidetracked, and the request of Governor John M. Parker, who promised sure action on them at the constitutional convention next spring. There is little difference in the two bills, except in the method of raising the money.



## Ford Buys Railroad and Coal Mine to Insure Fuel Supply

### Also Purchases Timber Tract to Furnish Wood for Closed Bodies

DETROIT, July 20—Henry Ford and his son Edsel have purchased the Detroit, Toledo and Ironton Railroad and four hundred thousand acres of virgin timber and mineral land in Upper Michigan. Announcement of the two deals was made yesterday, two days after officials of Ford Motor Co. had denied Ford was concerned in negotiations for the railroad.

Purchase of the railroad assures to Ford Motor Co. and to the city of Detroit, an uninterrupted, non-confiscable coal supply, as soon as the road can be put in shape. The road taps the coal fields of southern Ohio, West Virginia and Kentucky and is said to be capable of supplying all Detroit industries with fuel direct from the mines, in quantity sufficient to preclude fear of further interruption to industry from lack of fuel.

Lack of capital alone has hampered the road in the past and prevented it from supplying Detroit and Michigan industries with fuel. Although at one time capitalized at \$45,000,000, its life has been one of failures and receiverships and it has been sold at auction twice. It is crossed by fifteen railroads and besides hauling fuel will offer freight connections to all parts of the country.

It was stated at the Ford Motor Co.'s office, although unofficially, that the new gas car would be put on the road for passenger service and employees of the road will work on the Ford plan as regards wages, hours, housing and certificate investment privileges. The purchase involves 454 miles of main track, 155 of side tracks, 85 locomotives, 3,200 freight cars, 27 passengers and four round-houses in Ohio. Employees number 2000.

### Lumber for Closed Bodies

A report that the Ford company also was negotiating for Kentucky coal properties could not be confirmed at the company's office.

The land tract was purchased from the Michigan Land & Iron Co. and has 165,000 acres of hardwood timber, 100,000 acres second growth timber and shows pronounced indications of mineral deposits. The deal disposes of rumors that Ford has been negotiating for an iron mine. Leases on some of the mineral rights on the property are held by outside interests, but Ford's vast acreage held outright is believed rich in ore. Officials said if it was shown iron could be mined and marketed profitably, the tracts would be developed.

A closed body plant and saw-mill near Republic, Mich., will be constructed and although the exact location is not decided definitely, the Republic site is favored for its water-power facilities.

The tract will furnish all wood for closed bodies, requiring two hundred feet to a body and the green lumber after leaving the saws will go direct to the body plant. Steel parts will continue to be made in Detroit, but wooden parts will be shipped direct from the mills to various assembling plants to save freight and rehandling in Detroit. Conservation will be the keynote. The largest tracts will be cut first, the underbrush cleared away and every scientific encouragement given second growth timber.

Lynchburg, Va., July 21—The Banner Fork Coal corporation, in Harlan County, Kentucky, was purchased today by the Ford Motor Co. of Detroit, for \$1,500,000.

### CONSIDER REORGANIZING ALLEN

Columbus, O., July 20—Stockholders and creditors of the Allen Motor Co., Columbus automobile manufacturer, which went into the hands of receivers recently have received from Cleveland creditors a plan of reorganization, which is now being seriously considered. The creditors' committee reports that an appraisal of the assets of the company was made independent of the receivers and that the quick assets equal the liabilities. All of the assets including plant, real estate, machinery and stock on hands is valued at \$1,200,000 according to this appraisal. The committee is of the opinion that the assets are being jeopardized by operation under a receivership. The creditors' committee suggests that the stockholders loan the company \$500,000 for at least a year to take care of pressing claims and raise the receivership. Samuel L. McCune of Cleveland is suggested as syndicate manager under orders to report within thirty days the success or failure of the plan to raise \$500,000 as a loan to the company.

### BOSTON LAW CURBS THEFTS

Boston, July 20—Sixty stolen automobiles have been returned to their owners as the result of the operation of the new law relative to registering used cars with the authorities before selling them. The law has been in operation since the first of the year and it is expected that before the end of the year, hundreds of motor cars stolen by the thieves that infest Boston, will have been returned to their owners.

The law regulates the registration and sale of used cars, both by individuals and dealers. In the case of an individual, he must notify the state registrar of motor vehicles and the chief of police four days before selling a used car. The notification must be in writing.

### BIG DEMAND FOR ACCESSORIES

Memphis, Tenn., July 17—A conference of automobile accessory dealers and surrounding territory was held here in July. Meeting production demands and improved distribution were the chief subjects discussed. The business, it is said, has been ahead of the factories, and it will take the entire winter to catch up with the market of accessories.

## Car Thefts Show Increase — Drop Expected Under New Law

Total of 31,349 Stolen During 1919.  
—75 Per Cent Recovered.  
New York Heads List

ST. LOUIS, MO., July 21—There were 31,349 automobiles stolen in 1919 "index" cities of the United States in 1919 compared to 26,613 in the same cities in 1918, according to figures compiled by the National Automobile Dealers' association, headquarters in this city. This is an increase of 22.4 per cent. The figures were obtained from the official reports of the chiefs of police.

Of the 31,349 stolen in 1919, 23,332 were recovered, 74.4 per cent. Of the 26,613 stolen in 1918, 20,203 were recovered, 78.8 per cent.

Cars stolen which were not recovered were valued at approximately \$5,410,000 in 1918 and at \$8,658,360 in 1919.

New York again led the cities in cars stolen with 5527 in 1919 against 3340 in 1918, an increase of 35.5 per cent. St. Louis was the only large city where the number was less than in 1918. This is accounted for by a vigorous law enforcement campaign against automobile thieves. Sentences up to twenty years have been assessed in St. Louis for the theft of an automobile.

The detailed list follows:

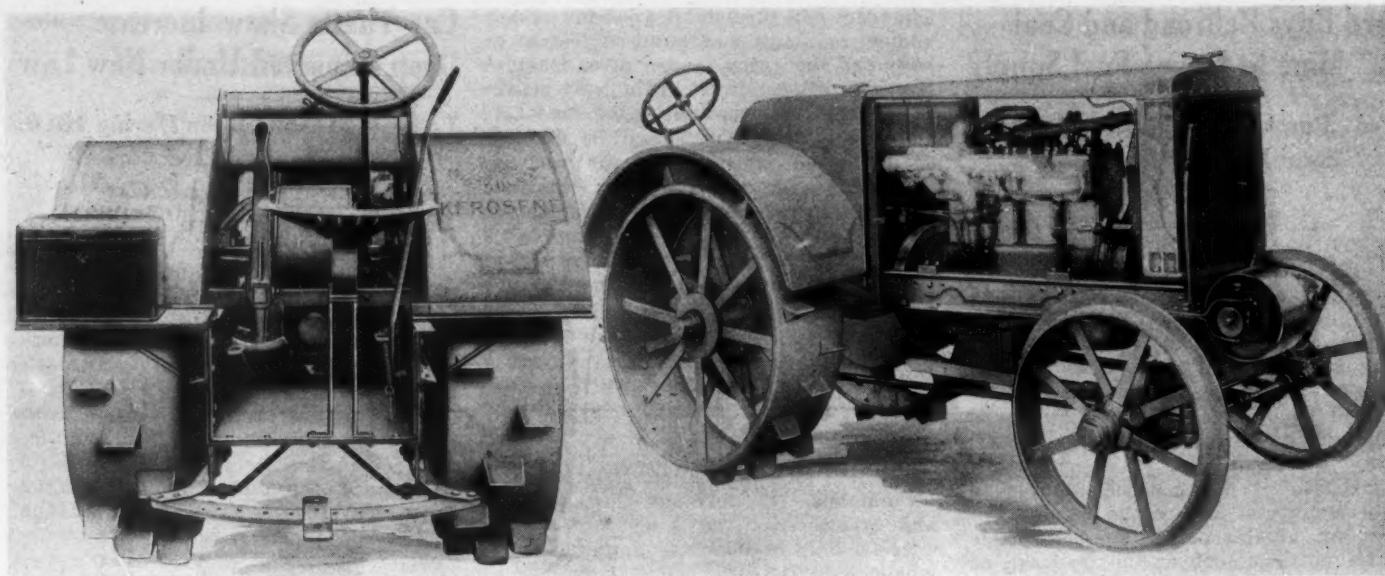
	Stolen		Recovered	
	1919	1918	1919	1918
New York.....	5527	3340	3124	2578
Chicago .....	4447	2611	3447	1954
Detroit .....	3481	2639	2529	1934
Cleveland .....	2338	2076	1786	1816
Los Angeles.....	1688	1629	1365	1499
Kansas City.....	1661	1144	794	606
Portland, Ore.....	1528	1088	1378	990
Denver .....	1440	901	1187	627
San Francisco.....	1354	1122	1304	1082
St. Louis.....	1241	2241	944	1354
Seattle .....	1122	1451	1398	1376
Indianapolis .....	1031	404	692	334
Boston .....	1002	866	580	607
Salt Lake City.....	776	797	758	790
Oakland, Calif.....	760	895	733	860
Omaha .....	734	1039	567	669
Columbus, Ohio.....	550	451	373	352
Cincinnati .....	520	348	293	291
Oklahoma City.....	149	571	70	484

Total.....31,349 26,613 23,322 20,203

General reduction in the number of automobiles stolen is expected during 1920 because of the fact that interstate transportation of stolen automobiles is made a Federal offense under the Dyer Law. The National Motor Vehicle Theft Law, however, did not become effective until November, 1919. Numerous convictions have been made throughout the United States under this act this year.

### ORGANIZE RUBBER COMPANY

Cincinnati, July 18—Plans are well under way for the erection of a plant for the Hercules Rubber Co., Cincinnati, a new corporation, with a capitalization of \$1,000,000, at Bridgetown, to make inner tubes for automobile tires.



Two views of the new AllWork tractor. The engine develops 25 h.p. at the belt and 12 h.p. at the drawbar. The power take-off is at the front and pulley operates at 900 r.p.m.

## ALL WORK TRACTOR DESIGNED FOR ORCHARDS

Specially Developed for California Orchard Conditions.  
Built Low and Narrow With Parts Protected, Enabling it  
to Work Close to Trees Without Damaging Branches

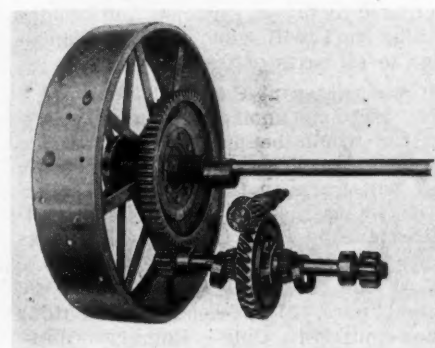
**I**N ADDITION to the regular 14-28 AllWork tractor, the Electric Wheel Company of Quincy, Ill., is now producing a special Orchard Model which has been brought out to meet the demands of the orchard growers in California and thus far, the entire output on this special model has been sold in that section of the country. It is a three-plow tractor with worm drive, special design of flat spoke wheel, belt pulley attachment at the front, and a short wheelbase. This new orchard model is completely built in the large shops of the Electric Wheel Co., and is known as the AllWork II tractor, or the California Special. The engine is much the same as that used on the AllWork 14-28 except that the new tractor engine has some improvements, including removable head cylinders. It

also has a quarter-inch less bore. The transmission is a three-speed type, while the final drive is a worm and gear drive, through the differential, to the bull pinions, where there is a final reduction to the bull gears in the drive wheels. A feature is that the worm is below the worm wheel.

### Designed for Orchard Work

The AllWork II was developed for California orchard and general farming conditions. This tractor is very low and narrow, with the parts properly housed that might break off the branches. The belt pulley drive being placed on the extreme front, makes it possible to have a very short wheelbase. The pulley attachment is designed so that it may be easily removed and in this way reduces the weight when plowing or other field work is to be done. The hitch is a special roller drawbar. Ball and roller bearings are used at all practicable points. The enclosure of all bearings and gears, in dust-tight housings and running in oil is a feature to insure long life, and is found on the new AllWork. Having the worm placed so as to drive the countershaft has proven to be a very practical application of the worm drive.

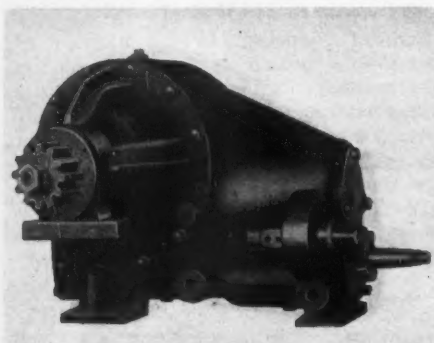
The AllWork II tractor is made in three units, the first is the engine with the multiple disk clutch, the second the transmission, and worm drive which are complete in a single case, and the third comprising the rear axle assembly. An additional minor unit might be named as the pulley drive unit at the front. The flexible coupling used to connect the engine to the transmission is the gear



Simplified illustration of AllWork rear axle drive

inside the internal gear type. The advantage claimed for the construction, as outlined, is that it greatly facilitates assembling the tractor and also makes a very accessible machine when the point of service is considered. The new machine weighs 4500 lbs. and has a drawbar pull of 2500 lbs. at plowing speed. Sixty-seven per cent of the entire weight is on the rear wheels, greatly aiding traction. It is 117 in. long; 54 in. wide; 55 in. high; has a wheel base of 78 in., a clearance of 12 in. and an up and down drawbar adjustment of from 16 in. to 20 in. above ground.

The engine is the four cylinder type having a bore of  $4\frac{3}{4}$  in. and a stroke of 6 in. It is capable of developing 25 hp. at the belt, and 12 hp. at the drawbar, at a speed of 900 r.p.m. Expressed in another way, it will drive a 24 by 32 thresher at full capacity.



The housing of the rear axle worm and reduction gears is dust-proof and allows the gears to operate submerged in oil



Lubrication is the combination force feed and splash, employing a cam driven plunger pump. Cooling is maintained by means of a McCord radiator, having cast side-frames and tanks. The governor is a flyball type completely enclosed and running in oil, a feature is that it is adjustable when the engine is running. Kerosene fuel is fed from a compartment tank having a capacity of ten gal. of gasoline, and twenty-five gal. of kerosene. The carburetor is a Kingston  $1\frac{1}{2}$  in. size, having the intake air drawn in through a Bennett air cleaner. Ignition is by means of a Kingston high tension magneto. The engine as a whole weighs 1000 lbs.

A multiple disk clutch is used and enclosed in the housing that is bolted to the flywheel. It has three 10 in. disks lined with raybestos. The transmission is the selective sliding gear type, having three speeds forward, and one reverse. The gears are machine cut from forged steel blanks and are double heat-treated. The speeds are  $1\frac{1}{4}$ ;  $2\frac{1}{2}$ ; and  $3\frac{3}{4}$  m. p. h. Plowing speed which is  $2\frac{1}{2}$  m. p. h. is a direct drive.

A noteworthy feature of the AllWork II tractor is the design of the power take-off. The pulley is 11 in. diameter with a 7 in. face and runs at a speed of 900 r. p. m. It is operated independently by a twin disk clutch, which is placed in or out by a long hand-lever located on the front right-hand corner of the main frame. The pulley housing is bolted to the front cross piece by four bolts. It receives its power from the front end of the crankshaft extension shaft.

## MERCER ADDS TWO CLOSED MODELS

TWO new Mercer models are announced, a touring limousine and a four passenger coupe as permanent models of the Mercer line.

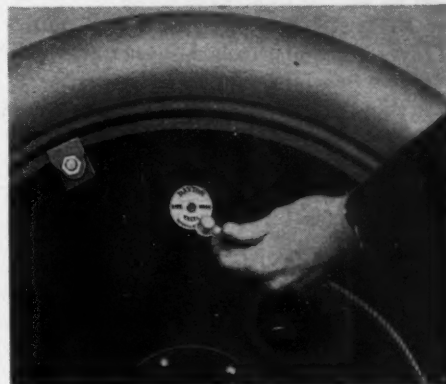
They will be mounted on a standard "22.5" Mercer chassis of 132-in. wheelbase.

The method of body construction employed on the new Mercer limousine and coupe is that of the custom-body builders. The frame work is of western ash with all joints mortised, glued and bolted. This frame is covered with a fine grade of aluminum sheets. The metal joints are finished with aluminum instead of brass moulding welded with a non-corroding flux. Thus, the possibility of electrolytic action, which is produced by using brass moulding, is eliminated. The roofs are of straight grain, bright finish leather over a padded hardwood base. The painting consists of fourteen separate coats. All hardware is of heavily nickel-plated brass. In order to preserve the Mercer body lines forward the radiator, fenders, bonnet and dash are the same as on the open models. All movable floor boards are interchangeable.

The touring limousine has two compartments, separated by an adjustable glass partition, which, when lowered, gives the owner the advantages of a Sedan. There are two doors to each

compartment and the forward compartment is trimmed in hand-buffed leather and the upper part of the rear compartment in cloth with wool carpet and silk roller shades to match. There is ample leg room in both compartments. In the rear are two folding, front facing auxiliary seats. Dome and corner lights are controlled by a button on the right hand doorpillar. Vanity cases are of inlaid wood.

The coupe has permanent wide seats for driver and two passengers, with folding auxiliary seat for the fourth person. Behind the driving-seat is a closed storage space and there is a larger, water and dust-proof space under the rear deck.



## Dayton Discwood

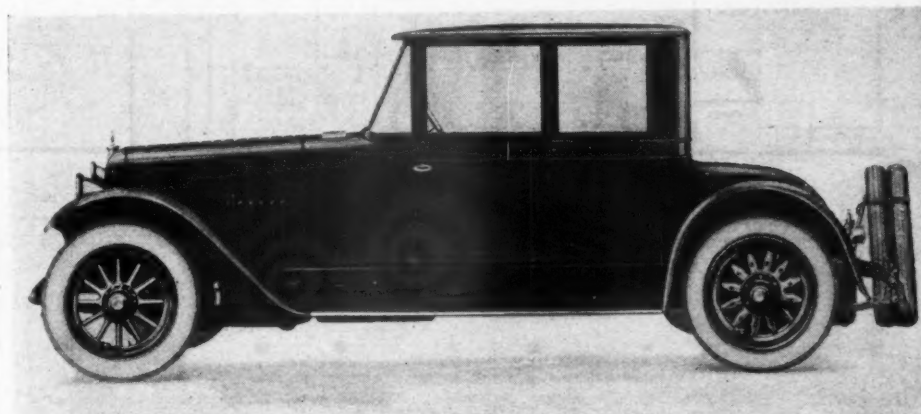
A NEW disk wheel for automobiles and trucks has just been announced by the Dayton Automotive Wheel Co., of Dayton, O. This new wheel, according to the officials of the company, marks a distinct advancement over any other wheel on the market.

Instead of being made of metal, however, as is the case with other wheels of this type, this new wheel is made of wood, hence the name, Dayton Discwood.

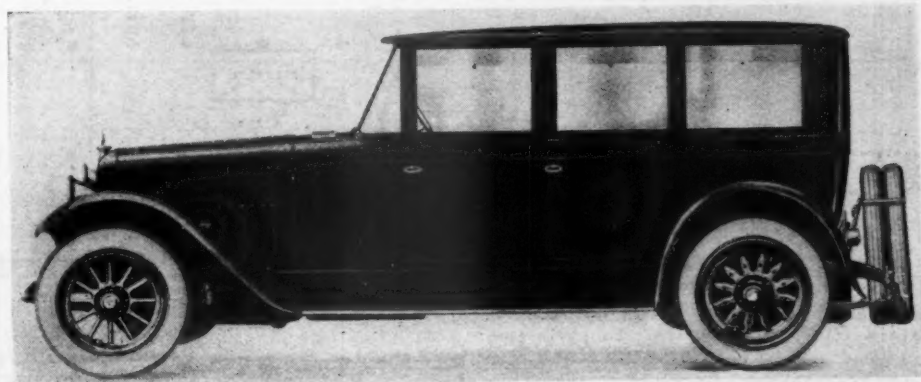
The wheels are made from thin, rotary slices of wood, glued together under great pressure. The grain of each piece running in a different direction from that of the piece next to it. This process of lamination makes the complete disk into a very strong, non-separable, non-warpable, but resilient whole, which at the same time is thoroughly waterproof.

This wheel has been thoroughly tested by the manufacturers and they say that the wheel will withstand more than one hundred per cent more resistance to side strains than the spoke wheel. Road shocks, it is claimed, are distributed evenly throughout the wheel. It is approximately the same weight as the ordinary spoked wheel.

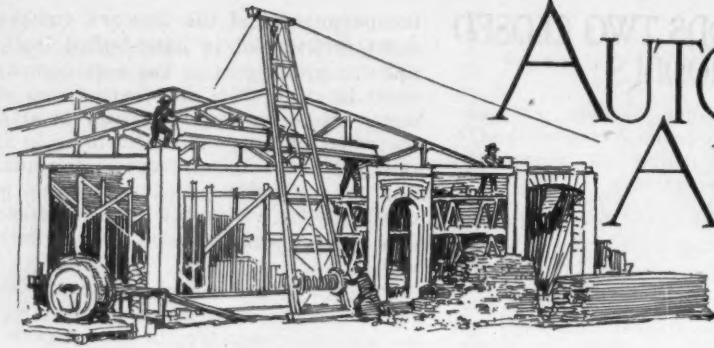
A point which will perhaps interest motorists and manufacturers is the ease and convenience with which the tire can be inflated. A practical patented angle valve attachment is applied to the wheel in such a way that the tire can be inflated from the outside face of the wheel. The accompanying illustration clearly indicates this feature. Also, any standard demountable rim can be used just the same as on the spoke wheel.



The new Mercer coupe and touring limousine below are mounted on the standard Mercer chassis



Mercer touring limousine has two compartments separated by an adjustable glass partition



# AUTOMOTIVE ARCHITECTURE

Planning and Building Problems



CONDUCTED BY TOM WILDER

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

## No. 247

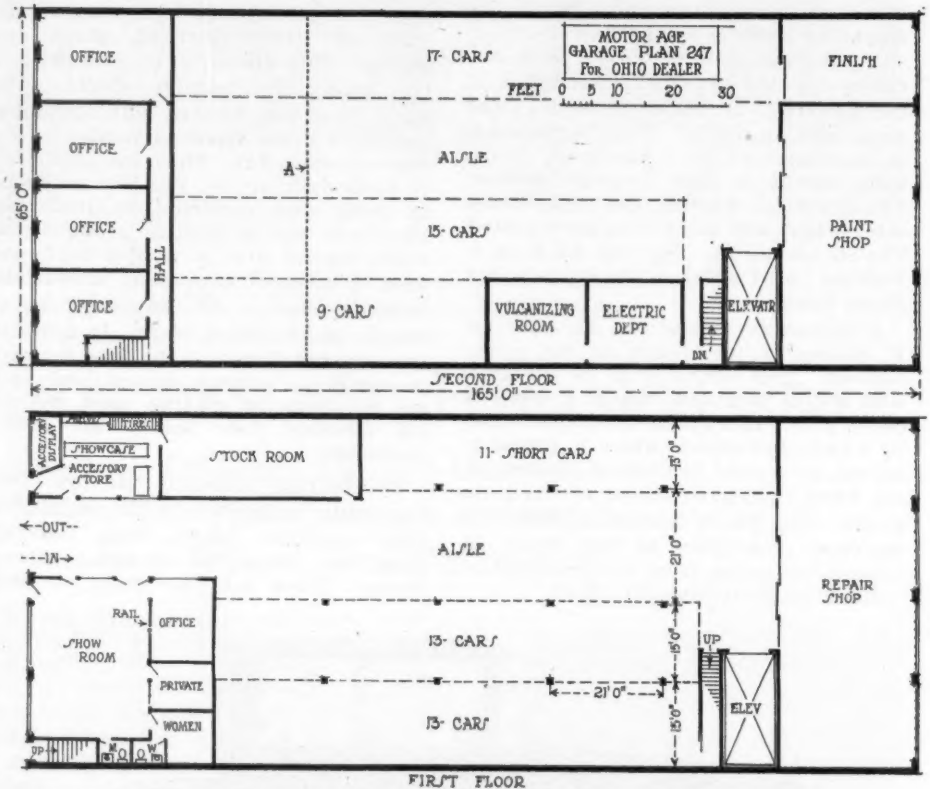
### GENERAL GARAGE WITH SALES AND SERVICE

Publish plans for a garage, sales and service station to be erected on a lot 65 ft. wide by 165 ft. long. Desire front entrance for the cars, with a display room for four or five cars. Stockroom to accommodate full assortment of Ford parts, some Buick and tractor parts. A good sized accessory department, shop room, vulcanizing and electrical departments on ground floor. On the second floor, 25 ft. front to be used for offices; storage room and paint department on this floor also.—Ohio dealer.

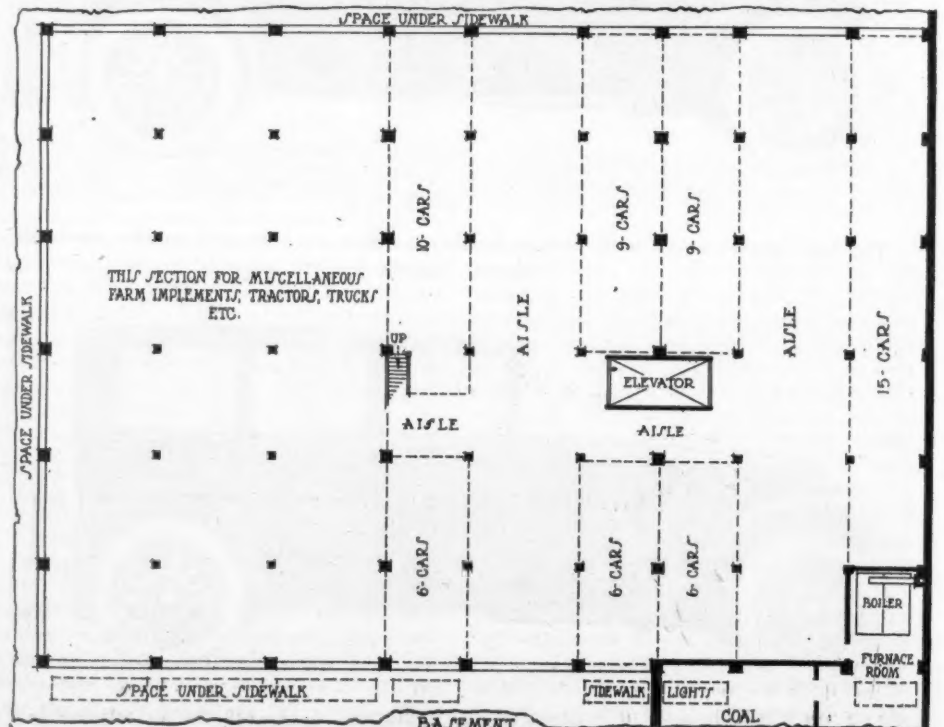
There is not much to be said about this plan; we have followed your suggestions as far as we thought best and have made some changes in the scheme.

There is no location for the vulcanizing and electrical departments on the ground floor, where there would be sufficient light without the use of artificial light, so we have shown them on the second floor, where a skylight will give them a plentiful supply.

If you plan to do a storage business, we advise moving the shop to the second floor also, thus gaining storage space for, at least, nine more cars on the first floor. In this way you could reserve the second floor for new cars, cut down

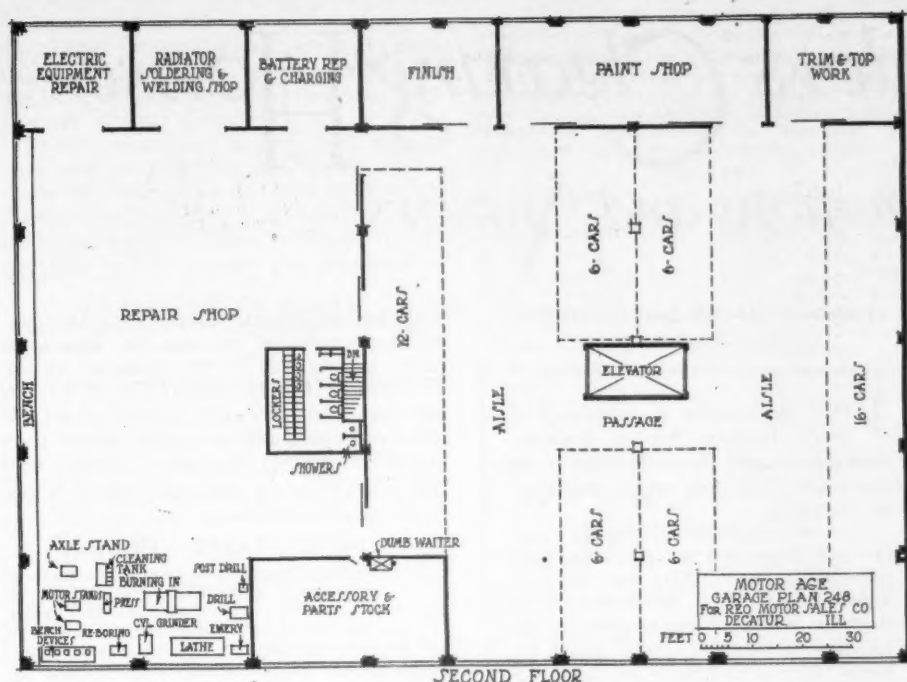


No. 247—First and second floor plan of general garage with sales and service



No. 248—Basement plan. First and second floor plans are on following page





be obtained by other means than windows, through which dust and dirt enters and lodges on the fresh paint and varnish.

The showroom in the plan will not accommodate four or five cars, as you request, but it can be enlarged by moving the offices, etc., back. The stockroom, likewise, can be enlarged if desired.

## No. 248

### SALES AND SERVICE STATION UNUSUALLY WELL LOCATED

We would like to have your suggestions on a plan for a salesroom and service station. The building is to consist of two floors and a basement, which will be erected on a lot with a 130 ft. front and 180 ft. depth. Paved streets on both sides of the lot. We had planned to use one-third of the front floor space for the salesroom and two-thirds of the rear floor space for the garage. The basement will be used as store room for dead storage of parts, cars, tractors, plows, etc., and the second floor for repair shop and some dead storage.—Reo Motor Sales Co., Decatur, Ill.

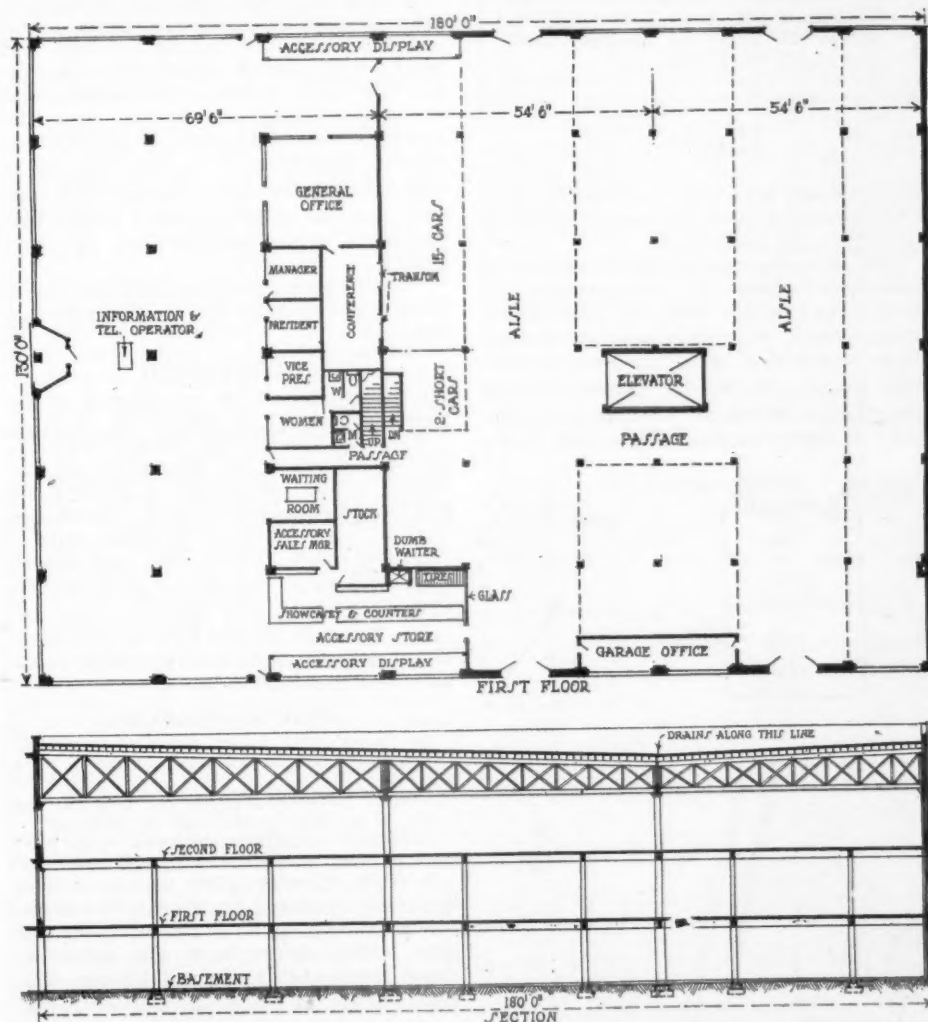
The location for your sales and service station is an unusually good one. A location of this sort has so many possibilities that it is extremely hard to select the best one and work it up. Frequently, when we have almost completed a plan, we have been working on, we discover that the arrangement is not the best that could be found but in this case we have had no such difficulty and everything has developed to a very good advantage.

The division of space is about as you desired. The proportion of the garage space is a little short of the two-thirds but nothing could be gained by taking it wider, unless cars are parked two deep, one row in front of another. This is not good practice, except for dead storage.

The spacing of posts in the front part is not the best for economical parking of cars but is better for showroom purposes. Consequently, that part of the basement which is under the showroom had better be used for the storage of farm implements and miscellaneous materials, which would be as well there as anywhere.

It is not a good plan to store your parts, especially, these subject to rust and mildew, in the basement. The little stuff that is carried in stock for a long time will eventually succumb. Even though the basement is perfectly dry, moist air will come in and condense on cool surfaces keeping them continually damp. This condition exists only in summer however; in winter a basement is as good a storeroom as any other place.

A roof construction such as we show in the longitudinal section of plan will afford a perfectly post-free second floor and even though the rear part should be built with posts for roof support, it would be best to use a trussed roof over the shop section. By draining the roof down through the building the drains are always warm and free from freezeups, which might flood the roof.



No. 248—Longitudinal section and first and second floor plans for sales and service station

elevator operating expense, and secure better working conditions and light for the shop.

Should this course be adopted, the paint shop would be moved to the front, with a partition at A, while the repair

shop would be at the rear. Windows are a disadvantage in a paint shop, while they are almost necessary for ventilation in a repair shop. We do not wish to imply that a paint shop does not need ventilation, but that the ventilation better

# The Readers' Clearing House

## Questions and Answers

### BUICK PISTONS

**Q**—Is the Buick model C 25 equipped with pistons having offset to counter-balance side thrust? If so, publish diagram showing installation of same. Is the offset to the right or left of the center—that is, if a plane divided the piston vertically through the center of the piston wrist pin, would the right or left portion of the piston be the larger? Illustrate.

**2**—May the engine of this model be removed from frame with flywheel intact? In other words, does the clutch and flywheel separate by simply removing flywheel with the engine or are they held together by the clutch pilot? How disengaged?

**3**—What is the best method in fitting new piston rings on new pistons?

**4**—What is the diameter of the wrist pins used in this model?—C. C. English, Booneville, Ark.

**1**—Buick sets the piston slightly to one side, as can be seen from the diagram in Fig. 1. The reason for the offset is to compensate for the reaction of the side thrust of the piston during the explosion stroke. When the piston is part way down on its power stroke all the power or pressure on the piston is transmitted to the connecting rod at an angle, which reacts against the piston wall in proportion to the angle at that moment, a mounting to a maximum at 45 deg. The only portion of this area is below the wrist pin. So by placing the largest area on the left side, the tendency is to tip the piston against the side thrust pressure and thus give a better equalized pressure.

**2**—The clutch and transmission are first removed and the engine is then taken out as a separate unit.

**3**—The ring should be carefully fitted to the groove of the piston, and should also be fitted to the surface of the bore. This latter fitting is done by lapping the ring surface to the bore with a small amount of abrasive compound. The ring can be conveniently fitted to an old piston during this lapping process.

**4**—This is a detailed dimension that we do not have.

### COMPRESSION AND FUEL ECONOMY

**Q**—Explain technically how an engine with a high compression ratio has a better fuel economy than an engine having a low compression ratio. Of the three principal factors that enter into the above problem such as wall cooling, the temperature of the fuel charge immediately before ignition and the reduced volume of the clearance gases, which do you consider the most important and explain same.—Hunter B. McElrath, Wilkinsburg, Pa.

An engine with a high compression operates under a greater effective pressure, than an engine with low compression. Mean effective pressure is one of the main factors that determine the efficiency of the engine. Now if the M.E.P.

### CONDUCTED BY ROY E. BERG

Technical Editor Motor Age

**T**HIS Department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

### Engines

is lower the horsepower output is lower and the engine does not develop as much power on the same fuel.

The three factors mentioned do not in any way effect the compression. Of course an engine with an abnormally long stroke will have an abnormally large amount of wall surface and this will tend to reduce the temperature of the charge which is warmed from the heat of compression. From high com-

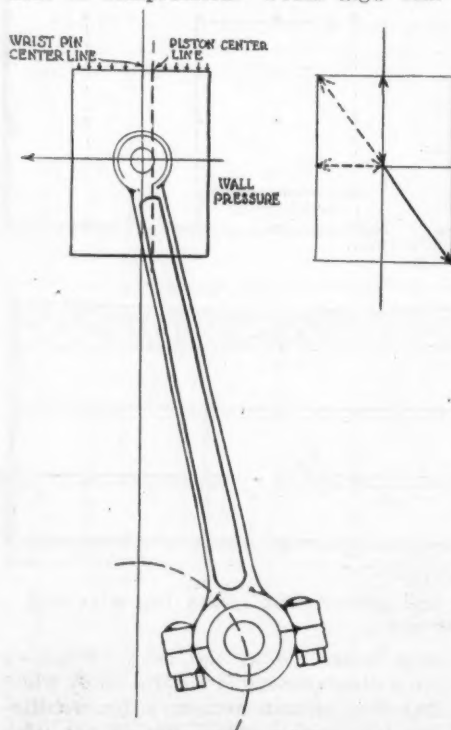


Fig. 1—Showing offset of Buick pistons

pression pressures there naturally results a reduced volume of clearance gases as you call it. By reducing as far as possible the volume of burnt gas in the chamber by such construction as valve in head, and as large intake passages as possible one gets a better volumetric efficiency and this factor gives better engine efficiency.

### ISOTTA VALVE TIMING

**Q**—Publish diagram of the valve timing of a 1906 Isotta-Fraschini, Baby 4, bore 2 3/4, stroke 4 in. The flywheel markings are in direction of rotation as follows: 0.8 30. 50. which are degree marks, but am in doubt as to which is for inlet or exhaust.

**2**—Give magneto setting for set spark.—John G. Tucker, Greenwich, Conn.

**1**—This car is so far out of date that we have no record in our files concerning the valve timing. We believe that the valve timing should be, from the markings on the flywheel, as follows Intake to open 8 deg. after top dead center and close 30 deg. after bottom dead center; exhaust to open 50 deg. before bottom dead center and close at top dead center.

**2**—For the magneto setting, the points should open about five deg. before top dead center.

### OVERHEATING

**Q**—Give reasons for overheating of the Chevrolet 490?—F. C. Baer, Java, S. D.

Examine the cooling system first, to see that there is no deposit in the radiator or any other part of the system. See that the fan belt is tight. If you are running on too rich a mixture, with a retarded spark, overheating will result. Improper valve timing or poor insufficient lubrication will give the same result. You will simply have to check up all of these factors and you will probably find the trouble-maker.

### ENGINE BALANCE

**Q**—The engine on an Allen 41 seems to be out of balance. Instruct how to correct it.

**2**—Can counterbalances for this car be had? If so, where can they be secured?

**3**—Would aluminum pistons help balance it?—W. R. Wilkin, Akron, Ohio.

**1**—This out-of-balance as you call it is probably caused by a general loosening up of the engine. Examine the engine holding-down bolts and brackets. These are probably somewhat loose. The bearings are, no doubt, worn slightly, and a careful examination of these is recommended. It should be remembered that a four-cylinder is naturally inclined to have more vibration than a six, and for this reason a four needs more careful attention to those parts which are apt to loosen.

**2**—We know of no concern making counterbalances for all makes of cars



The Dunn Counterbalance Co., Clarinda, Ia., makes a specialty of counterbalances for Ford car and, perhaps, they can help you out of your difficulty.

3—Yes, aluminum pistons will help a long way in relieving the engine of its vibration. However, be sure that when fitting them that they are fitted properly. The clearances should be right, or oil pumping trouble is very apt to start.

### SHAFT OUT OF ROUND

Q—Would you advise having the crankshafts on a Dodge and Ford reground if they were out of round 0.001 in.

2—How much would cause the connecting rods to be noisy?

3—A Dodge seems to coast further with the throttle open and clutch pedal out and ignition off than it does with same and throttle closes. Would an air-tight throttle valve have a tendency to work as a brake on the engine?—Jack Holland, Fyndyl, Utah.

1—If a shaft is out of round as much as this it will in a short time squeeze the babbit out and a connecting rod bearing knock will occur.

2—This is a question that cannot be answered as it will vary a great deal, depending upon the composition of the metal, the speed of the engine, etc.

3—This is very true, for when the throttle is closed the engine is forced to work against a vacuum.

### THOMAS FLYER VALVE TIMING

Q—Publish the valve timing in degrees of a 1912 Thomas Flyer, 6-cylinder, 4 1/4 by 5 1/2 in. engine. Desire to set both camshafts up. What timing would you advise?—L. H. Friedlander, Memphis, Tenn.

The valves on the Thomas Flyer are timed as follows: Intake valve opens 10 deg. after top dead center and closes 30 deg. after bottom dead center. The exhaust valve opens 40 deg. before bottom dead center and closes 5 deg. after top dead center. The valve timing is dependent upon the purpose for which the car is to be used. We do not advise changing the valve timing, unless you intend to use the car for racing purposes. If the valve timing is increased one tooth, you will get better operation at high speeds, but it will be impossible to throttle down and the car will not give satisfaction at low speeds.

### NASH SIX VALVE TIMING

Q—If a Nash six has offset pistons or connecting rods, what side of the piston goes to the camshaft, the narrow or thick side?

2—Publish valve timing diagram of the Nash six.

3—What is the speed of the Nash six?—A. G. Stanley, Wichita, Kans.

1—The 1920 Nash engine viewed from the front has the camshaft on the left hand side and when sitting behind the wheel, on the right hand side. We say this first, merely that there will be no confusion with regard to positions. The centerline of the wrist pin and the centerline of the piston itself occupy two different positions. When viewing the engine from the front, the centerline of the piston should be to the right of the wrist pin centerline, or with regard to the wrist pin centerline, the larger surface will be opposite from the camshaft side.

2—The timing diagram of the Nash is shown in Fig. 2.

3—This is a difficult question to

TO assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

### ENGINES

C. C. English.....Booneville, Ark.  
Hunter B. McElrath.....Wilkinsburg, Pa.  
John G. Tucker.....Greenwich, Conn.  
F. C. Baer.....Java, S. D.  
W. R. Wilkin.....Akron, Ohio  
Jack Holland.....Fyndyl, Utah  
L. H. Friedlander.....Memphis, Tenn.  
A. G. Stanley.....Wichita, Kans.  
A Subscriber.....Texarkana, Ark.  
L. W. Paddock.....Dayton, Ohio  
Frank A. Pelican.....Hillhead S. Dak.  
Edward Leech.....New York, N. Y.  
Paul D. Kern.....Sherman, Tex.  
C. W. Garman.....Wellsville, Ohio  
Emile T. Pepin.....Woonsocket, R. I.  
R. E. G.....Waterloo, Mont.  
Martin A. Walline.....Turlock, Calif.

### THE ELECTRIC SYSTEM

Clemens T. Eger.....Denver, Colo.  
F. Daricek.....McNary, La.  
A. Reader.....Knoxville, Tenn.  
Phillip C. E. Loass.....Botkins, O.  
Wesley Law.....Klemme, Iowa  
G. K. Herinckl.....Pasadena, Calif.  
Paul Williams, Buick Service Station foreman.....Taylorville, Ill.  
Roy Kutschenreiter, Square Deal Auto Repair Shop.....San Antonio, Tex.  
C. G. Kahant.....Elizabeth, N. J.

### MISCELLANEOUS

P. H. Briscoe.....Meyers Falls, Wash.  
Paul M. Cramer.....Dalton, Neb.  
Leo E. Gutterman.....Slayton, Minn.  
Harry Sawtall.....Colo, Ia.  
F. A. Work.....Tiffin, Iowa  
Emerson Kagy.....Van Buren, O.  
F. A. Tolman.....Brookline, Mass.  
Richard Floyd.....Sugarite, N. M.  
W. H. Hunt, First Heavy Mobile Repair Shop.....Camp Meade, Md.  
J. M. Dismant, Red Cliff Garage.....Red Cliff, Colorado

answer. The conditions are the determining factors. The driver has a good deal to do with it. Under average conditions and good roads with no head wind, 60 m.p.h. should be obtained.

### HUMMING NOISE

Q—There is a humming or whirring sound in the transmission of a 1919 Hupmobile R-2 which has been run about 2500 miles. It sounds as if it were made

by the countershaft. It stops when the car is coasting with gear lever in neutral. Am thinking of putting Dixon's graphite Gear Oil No. 675 in the case, as this is said to silence noisy gears to some extent. The noise stops when the clutch pedal is pressed all the way down, but starts again when the clutch spider starts to revolve again.

2—Instruct how to take up wear in Detroit universals.—A Subscriber, Texarkana, Ark.

1—Because of the vague description it is impossible to give positive reasons for the trouble. The noise may be coming from the transmission or it may be in the clutch. The fact that the noise stops when the clutch is thrown out might indicate that the clutch throw out bearing is worn and is causing the trouble. If the noise occurs in all gear positions it is undoubtedly due to one of two things, either the clutch throw out collar is at fault or the rear bearing the main transmission shaft is worn.

2—It is not possible to take up the wear in this joint but the trouble may possibly be remedied by putting in a new thrust bearing.

### HORSEPOWER

Q—Are there any present day cars on the market as high as 75 hp.? Name them.—L. W. Paddock, Dayton, O.

The following cars are rated at 75 horsepower: Cadillac, Cole, Douglas, Hudson, Marmon, McFarland, Murray, Owen-Magnetic, Packard, Peerless, Pierce-Arrow, Richard, Revere, Singer, Winton, and Wolverine. There are several others which have not been able to get the maximum horsepower developed.

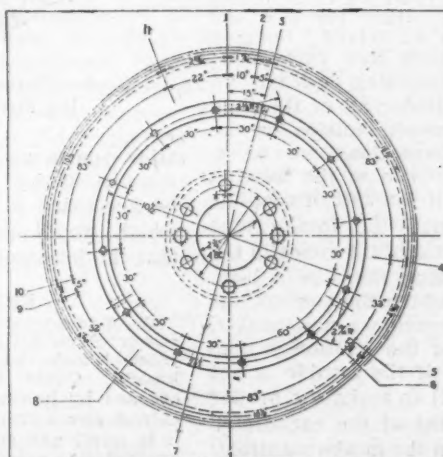
### INSTALLING PISTON RINGS

Q—In installing new Ford rings which side should be placed up?

2—In installing a leak-proof piston ring, should it be placed in the top or second groove?

3—Why are the pistons in a gas engine tapered at the edge?—Frank A. Pelican, Hillhead, S. Dak.

1—Ford piston rings are of a tapered shape. The top of the ring is smaller in diameter than the bottom. The upper side of the ring is marked with a small cross.



FLYWHEEL TIMING CHART

- 1—Dead Center
- 2—Exhaust closes Nos. 1-6
- 3—Intake opens Nos. 1-6; exhaust opens Nos. 3-4
- 4—Intake closes Nos. 3-4
- 5—Exhaust closes Nos. 2-5
- 6—Intake opens Nos. 2-5; exhaust opens Nos. 1-6
- 7—Extended line for drilling flywheel
- 8—Intake closes Nos. 1-6
- 9—Exhaust closes Nos. 3-4
- 10—Intake opens Nos. 3-4; exhaust closes Nos. 2-5
- 11—Intake closes Nos. 2-5

Fig. 2—Valve timing chart of 1920 Nash 6

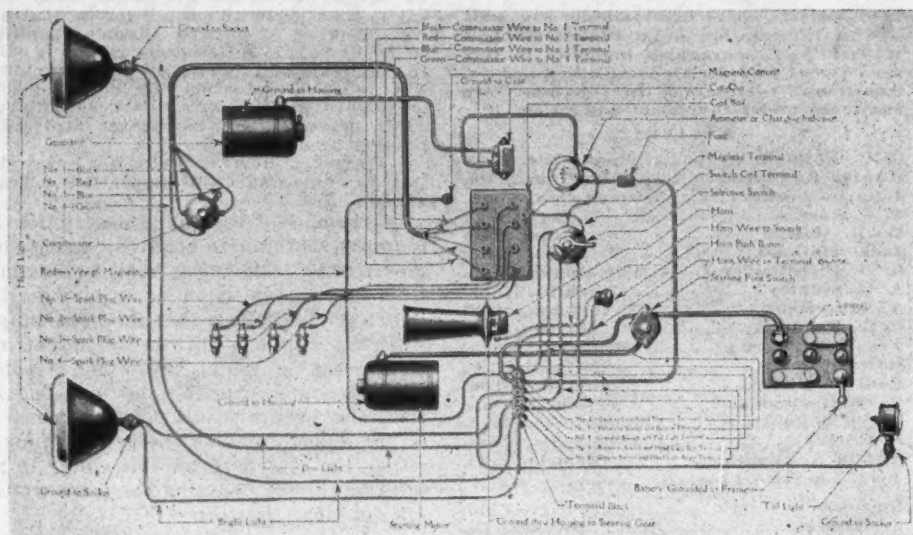


Fig. 3—Showing F. A. or Liberty system employed on a Ford

2—There is a variance of opinion concerning application of patented rings to the piston. We have had experience with several different methods of arrangement and have found that an ordinary snap ring in the top groove, with a good patented ring in the bottom groove, gives very satisfactory results. This arrangement works very well, especially if one is making long tours where many kinds and grades of lubricating oil are encountered. A quantity of poor oil is apt to gum up the rings and prevent their functioning and by applying a snap ring to the top groove much of this trouble is eliminated.

3—This is generally done to relieve the oil which gathers in back of the ring.

#### MISSING AT LOW SPEEDS

Q—A 1918 4-cylinder Moline Knight 3½ by 5 in. engine, when running idle or at low speed misses in one or another cylinder. When running 10 m.p.h. or over it the ignition and carburetor function. In testing each cylinder for individual performance no miss occurs, each and every one fires correctly, the heads and pistons have been removed, thinking there might possibly be a leak. Have replaced one ring on No. 3 with an Inland. Suggest remedy.—Edward Leech, New York.

The fact that the missing does not occur in the same cylinder all of the time seems to indicate weak ignition or the intake manifold connections are loose. Allow the engine to run at the missing speed. Take a small can full of gasoline and squirt it around the intake pipe joints. If you detect any difference in the running of the engine there is a leak. The remedy is to tighten the connections and, if necessary, provide a new gasket. It is best to go over the ignition system carefully and then, if the trouble is not eliminated, it is well to make the proper low speed adjustment of the carburetor and make the test on the intake manifold.

#### CHANGING PISTON RING SIZES

Q—Can the piston ring grooves in the Paige 6-39 roadster be cut out to carry a 5-16 Double Seal piston ring?

2—Will such procedure weaken the piston or the lands between the rings enough to make it undesirable?—Paul D. Kern, Sherman, Tex.

1 and 2—This procedure is not advisable as there is not enough metal to

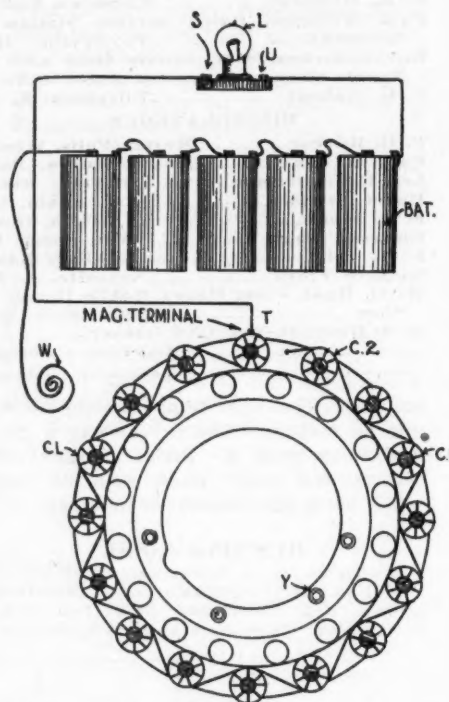


Fig. 4—Illustrating method of testing Ford magneto coils

allow you to use a  $\frac{1}{8}$ -in. ring. At present the ring used is only  $\frac{1}{16}$  so that it would be necessary to cut out  $\frac{1}{4}$  in. of metal which would make the lands so thin that the job would not prove satisfactory.

#### FUEL KNOCK

Q—A four-cylinder Buick D 35 was very powerful on hills but now there is a decided knock, which I believe is a fuel knock. Could the compression be increased by having the cylinder head machined down from  $\frac{1}{8}$  to  $\frac{1}{16}$ -in. more than it is now? and still be able to handle the present day gasoline with good results? When this engine is idling slowly it does not run as smoothly as it should. If it runs very slow it will stop. The carburetor is properly adjusted.

2—Is it possible to draw a rim to the former size when it has become too loose for the wheel?

3—Do you advise using any kind of a re-carburetor attached to the manifold.—C. W. Garman, Wellsville, Ohio.

1—If the engine is suffering from a

compression knock, which is a fuel knock, then lowering the head will only aggravate matters and produce a louder knock. The proper thing to do is to insert a thicker gasket and thus lower the compression. Lowering the compression with heavy fuel will reduce the fuel knock, but increasing the compression, as you propose to do, will make conditions worse.

2—This will depend upon how much too large the rim is. If the rim has enlarged but a slight bit, due to running on a flat tire, then perhaps, by careful drawing the rim can be made to fit as it should. This is a case where conditions will govern and judgment must decide.

3—If the carburetor in use is of an old style, then a new carburetor or some better means should be employed to help the old carburetor.

#### VALVE KNOCK

Q—A Buick, model H-45, has a very loud knock, it seems to be a valve that stays open at times, which causes the gas charge to stick in valve cage area, causing a knock. Is this possible?

2—This model does not throttle down below ten to 12 m.p.h. on high gear without bucking quite a little, but upon acceleration picks right up. Have checked ignition, readjusted carburetor and valve clearance. Give remedy.—Emile A. Pepin, Woonsocket, R. I.

1—The knock is very likely caused by a sticky valve stem, as a result of carbon deposit. It may be due to poor seating of the exhaust valves. If it is a very loud knock, it may be a loose connecting rod bearing or loose wrist pin. It would be advisable to grind in all of the valves and see if the valve stems fit properly.

2—Failure to throttle down is probably due to worn valve stems. If the intake valve stems are so worn that the valves will spin, air will be admitted directly through the valves and it will be impossible to get a good carburetor adjustment. The writer has had this experience with a Buick D 45, and the trouble was remedied by installing new intake valves. There are, however, many factors that have a bearing on the throttling performance of an engine and it is necessary that everything be in perfect adjustment, in order to get smooth running at very low speed.

#### RAISING COMPRESSION

Q—Will raising the compression on a 1916 Ford to 70 lbs. give any better satisfaction? Will the engine stand it?

2—Can a Metz cam and crankshaft be fitted on a Ford?—R. B. G., Waterloo, Mont.

1—If you intend to use this car for fast work, it should be very advisable to raise the compression but if not, we advise leaving the compression as it is. The compression should be about 60 lbs. Increasing the compression is apt to pave the way for a fuel knock and you will have some difficulty in throttling down.

2—We do not have the complete details of these camshafts in our files and, therefore, we cannot say whether they are interchangeable or not.



## The Electric System

### TESTING MAGNETO COILS

Q—By what other method than is used by agencies is it possible to test Ford coils?

2—What should a Ford magneto test when it is in good condition? When it needs recharging?—Clemens T. Eger, Denver, Colo.

1—In answering this question we are assuming that you mean the coils in the Ford magneto. The test for grounds is as follows: Connect five or six dry cells to a six-volt lamp as shown in Fig. 4. Attach one end of the terminal from the lamp to the magneto terminal. Then unsolder the grounded end of the winding at C-2. With the other wire from the battery, touch the iron frame. If the lamp lights, then there is a ground of one of the spools in contact with the frame. The next step will be to find out in what particular portion of the winding the ground exists. Attach the test wire W to metal part. This can easily be done by inserting the nut or temporarily making a soldered joint at the point where the permanent ground was formerly attached, lamp will then light. Loosen the coils one at a time and shake vigorously, or move up and down, this will cause the light to flicker or go out and on when you reach the coil or section where the ground is located.

2—To test the magnets on the flywheel, a block of steel of the same weight as the camshaft gear should just hang by a corner. Failure to hold the weight indicates weak magnets.

### DELCO SYSTEM ON BUICK

Q—Publish wiring diagram of the 1918 Buick model E-49.—F. Daricek, McNary, La.

The 1918 wiring diagram is shown in Fig. 6.

### LIBERTY ELECTRIC SYSTEM

Q—Publish wiring diagram of Ford engine with Liberty starter and generator.—A Reader, Knoxville, Tenn.

This is shown in Fig. 3.

### SPHINX WIRING DIAGRAM

Q—Publish wiring diagram of the Sphinx car, model A-15. At present it has the Apeldo ignition system, but I am going to install the Connecticut system. Make diagram for this system.—Philip C. E. Loass, Botkins, O.

A diagram depicting the connections of

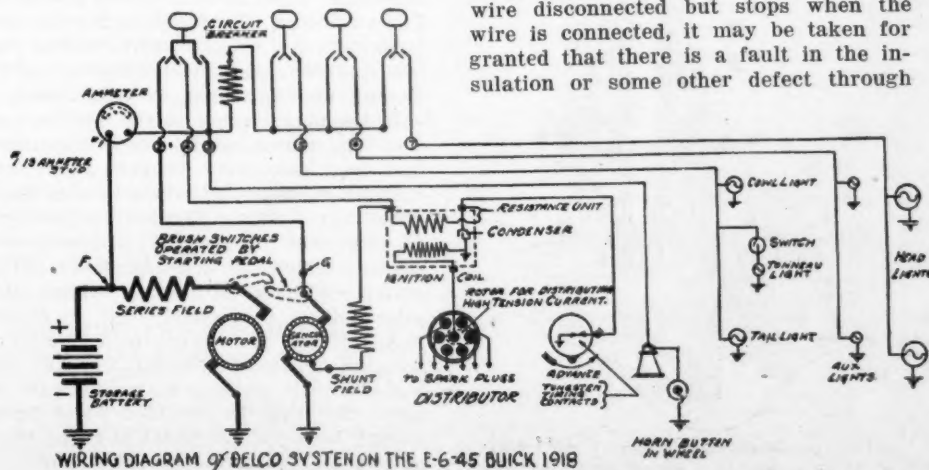


Fig. 6

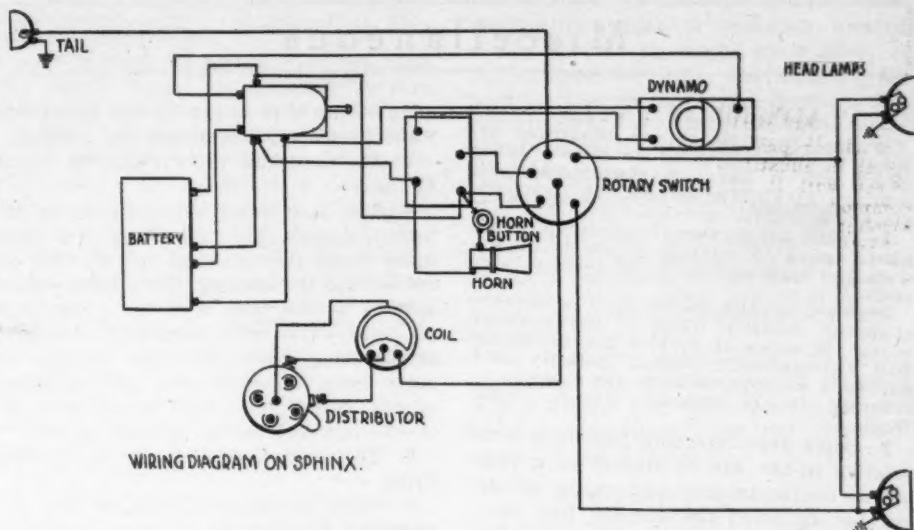


Fig. 5—Showing wiring system on a Sphinx A-15

the Sphinx car is shown in Fig. 5. This diagram is the same as the connections now on the car, with the exception that the wire leading from the central connection is shown in the diagram connected to the Connecticut ignition system as you request.

### MELTING POINTS

Q—At what temperature do the following metals melt, cast iron, brass and aluminum?—Wesley Law, Klemme, Iowa.  
Cast iron, white, 1922 to 2075 deg. Fahr.  
Cast iron, grey, 2012 to 2786 deg. Fahr.  
Aluminum, 1214 deg. Fahr.

The melting point of brass varies a great deal and is entirely dependent upon the composition of the alloy. The melting point runs all the way from 750 degrees C to 1290 degrees Fahr.

### MAGNETO FAILS SUDDENLY

Q—The Swiss magneto on a car works fine at low speed but on increasing the speed the spark jumps at the safety gap and no spark at the plug. What is the trouble?—G. K. Horinchi, Pasadena, Cal.

A sudden failure of the ignition, such as described, indicates a short-circuit in the low tension cable, either through a defect in the cable through a faulty connection of the switch, or through the presence of dirt or moisture. This may be tested by removing the ground cable from binding post on the magneto and endeavoring to start the engine on the magneto. If the engine runs with this wire disconnected but stops when the wire is connected, it may be taken for granted that there is a fault in the insulation or some other defect through

which the low tension current escapes to ground. It is also advisable to examine the carbon distributor brush to ascertain if it is in good condition. This brush may be exposed by removing the distributor plate.

### STARTING TROUBLE

Editor Motor Age—Referring to the May 27 issue of Motor Age in which the Hildebrand Motor Co. of St. Matthews, S. C., states it has been having trouble with a Delco starting, I believe the trouble is in the bracket holding the field brush. It should raise off the face of commutator when starter brush engages. If it fails to raise then it will act just as stated. A new bracket can be obtained at a low cost and will do the work.—Paul Williams, foreman Buick Service Station, Taylorville, Ill.

Editor's Note: Examine the brush holders and see if this brush is lifting during the starting operation. It may not be necessary to purchase a new bracket, as this trouble sometimes occurs as a result of an accumulation of sticky, gummy grease.

### CHARGING RATE

Q—What amperage should the ammeter register at a car speed of about 20 m.p.h.?

2—What charging rate should a practically new battery stand? Desire to adjust the third brush to charge as high as safety will allow, as the car is used very little.—Roy Kutschenreiter, Square Deal Auto Repair Shop, San Antonio, Tex.

1—The charging rate at a car speed of 20 m.p.h. is about 12 to 15 amperes on most systems.

2—We believe that the above mentioned charging rate should prove satisfactory, even if the car is used only a very little.

### FRANKLIN AMMETER INSTALLATION

Q—Is it possible to replace the current indicator on a 1917 Franklin with a regular ammeter. Have been informed that such an ammeter would be burned out by the starting current.

2—Is an ammeter made that could be safely used?—C. G. Kahant, Elizabeth, N. J.

1-2—Install a Roller-Smith ammeter, as this instrument is designed to handle the heavy current that will occur during the cranking operation. This instrument is manufactured by the Roller-Smith Co., Woolworth Bldg., N. Y.

## Miscellaneous

### ALCOHOL AS A FUEL

Q—Is it possible to use denatured alcohol in substitution of gasoline? What effect will it have on engine and will common carburetor handle it? Will the alcohol mix with gasoline?

2—What proportion is ammonium phosphate mixed in solution to use in aluminum and lead rectifier? Is common salt added?

3—What is the cause of a generator changing polarity while in use? About every 100 miles of service the generator will automatically change polarity and will then not charge until the polarity is reversed.—P. H. Briscoe, Meyers Falls, Wash.

1—Some experimenting has been done relative to the use of alcohol as a fuel, but so far, carburetor and engine design has not followed the alcohol fuel idea. Present engines and carburetor will not handle alcohol satisfactorily. The proper thing for the automotive engineer to do is to design his engine to handle the fuel that is now available.

2—The rectifier mentioned uses an aluminum plate and a cast iron plate. If the solution is made using about one pound of phosphate to a gallon of water it will prove very satisfactory. Nothing is added to the phosphate solution.

3—This is probably due to the weakness of the battery. Since we do not know what system you are using and have no detailed description, it is impossible to give a positive answer.

### WATER PUMPS

Q—Can you give some estimate of how far water can be drawn by piston pump or centrifugal pump, that is by suction not by lifting. Our altitude is about 4300 feet.—Paul M. Cramer, Dalton, Neb.

A suction pump can lift water 33.8 ft. providing that there is no friction in the pipe and that there are no leaks in the pump. This it should be remembered calls for a perfect air pump and such a thing is not obtainable. Practically a water column only 35 ft. is the average height for a pump to operate against. This figure is based on an air pressure of 14.7 lb. per sq. ft. At an altitude of 4000 ft. under standard conditions, the barometric reading will be 22.5 in. app. and the height to which water can be lifted will be 31 ft.

### SPEEDING UP PEERLESS

Q—What is the best way to speed up an 8-cylinder Peerless engine used in the Peerless 56. The car is to be used exclusively for racing. What ignition system and carburetor? Am thinking of having cylinders rebored and fitted with aluminum alloy pistons and connecting rods. Should this be satisfactory for racing purposes?

2—What way should the camshaft be ground for racing?

3—Should the valve area be increased? If so, how much?

4—What is the highest gear ratio that can be used without losing a fast pickup? Car uses 32 by 4 wheels.

5—What is the brake horsepower of this engine?

6—What should the speed of the car be with above alterations?—John S. Nickel, Jacksonville, Fla.

1—The advisable thing to do is to install lighter pistons and connecting rods.

2—We do not believe it will be necessary to change the camshaft as you

ought to be able to get all the speed you want by simply advancing the timing.

3—Increase the valve diameter about  $\frac{1}{8}$  in.

4—The gear ratio will have to be determined according to the kind of a track upon which the car is to be run. We do not believe the housing will accommodate a ratio of less than 4 to 1. A decrease of gear ratio will naturally decrease accelerating power but the increase of valve area, together with the lessening of the car weight, will offset this decrease in acceleration to some extent.

5—This engine develops 80 hp. at 2800 r.p.m.

6—With the above alterations the car ought to make in excess of 80 miles per hour.

### GAS SAVER

Q—Is there a gas saver made for the Chandler? If so, where is it made and do you advise using one?—Harry Sawtell, Colo. Ia.

There is a great many devices on the market for the purpose of saving gasoline. Some of them are tablets that are dissolved in the gasoline. Generally the gas savers as they are termed consist of some heating device to more thoroughly heat the mixture of fuel and air. One little device termed a gas saver is a small rotating wheel placed in the intake manifold which revolves very rapidly as the mixture passes through the passages. It is claimed that this small wheel revolving at a very high rate of speed breaks up the particles of fuel. This device was recently described in MOTOR AGE.

### PAIGE INFORMATION

Q—What is the maximum brake horsepower of the 1917 Paige 6-51? At what number of revolutions per minute does it develop its maximum? Publish power curve. Continental engine. What is the maximum number of revolutions per minute I could possibly get from this engine, with most favorable conditions?

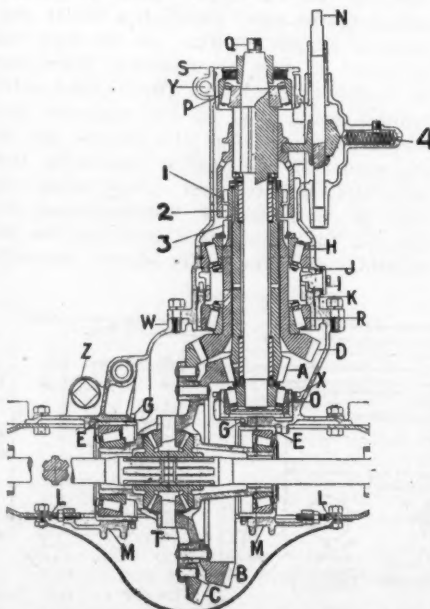


Fig. 7—Sectional view of 1914 Cadillac two speed axle

2—What is the gear ratio of this car?  
3—What is the maximum speed I should be able to obtain under most favorable conditions?

4—What is the valve timing of this engine in degrees?

5—Would you suggest setting the camshaft ahead one tooth?

6—Would it decrease the pulling power or increase it? How much would it increase the maximum speed? Would setting the camshaft ahead be detrimental to flexibility and all around service?

7—Explain fully as possible the difference it would make in the operation of the car?

8—How many degrees will one tooth on cam gear make? How many teeth should it be changed? Instruct how to change it.

9—The gears in this car seem to continue to spin when the engine is running and clutch released with car stationary. It is very difficult to get in gear. Have washed the clutch with kerosene and lubricated with new cylinder oil. Give remedy. The clutch will slip when in low if engine is raced but there is no adjustment.—F. A. Work, Tiffin, Ia.

1—This engine develops 55 hp. at 2100 r.p.m. The power curve of this engine was published in the March 18, issue of MOTOR AGE. Under average conditions the maximum speed of the engine may be somewhat higher than 1900, probably about 2350 r.p.m.

2—Information not available.

3—Under very favorable conditions the car will give a maximum of about 55 to 60 m.p.h.

4—The intake opens 10 deg. after top dead center and closes 28 deg. after bottom dead center. The exhaust opens 40 deg. before bottom dead center and closes 2½ deg. after top dead center.

5—If the camshaft is set one tooth ahead you will get better operation at high speeds but the engine will not work well at low speeds.

6—It is practically impossible to state how much the maximum speed would be increased by a setting of this kind, but we do believe that this setting will be detrimental to the flexibility and all around service you are getting at the present time. This change will not make a noticeable difference in the way the car will act, so far as pulling power is concerned.

7—The most noticeable feature that the driver will notice is that the car will not throttle down. Aside from this there will be no change in performance.

8—We have not made it a point to get this kind of information but we do not advise changing the valve timing unless the car is to be used for racing purposes. The engineers who designed the car, determined the proper valve timing for the conditions under which the car would be run and any changes will interfere with the performance of the car.

9—The clutch used is of the multiple disk type, consisting of seven thin hardened steel disks and seven heavier steel disks, alternating. These disks are held in frictional contact by a heavy coil spring, which is non-adjustable. The clutch runs in a bath of oil. Your slipping trouble is probably due to clutch linkage. See that there is a clearance between the clutch pedal and the toe board at all times. An adjustment to allow for this is provided by a turn-buckle between the pedal and the lever on the clutch throw-out yoke shaft.



**ANTI-LEAK COMPOUNDS**

Q—When the clutch on a Paige Brooklands 51 is released with the engine running there is a continual rattling as long as the pedal is held down. What causes this and how can it be remedied? Will it do any harm? It is difficult to shift gears on this car without bumping them. When the car is standing and the engine running it seems as though the gears keep running when clutch is released so they bump when it is put in low but it will mesh immediately regardless of clashing. They also do this when running and shifting from one speed to another. What causes this and how can it be remedied?

2—Do you recommend the use of a radiator compound to stop leaks? Will it stop a leak in the engine block caused by a crack?

3—Will it injure the radiator or hose in any way?

4—How much oil is required to fill the oil reservoir of this engine?

5—What is the capacity of the gasoline tank?—F. A. Work, Tiffin, Iowa.

1—This is probably due to the clutch brake or the clutch throw-out collar. If the clutch brake is out of adjustment it will allow the clutch to slip and it will be very hard to engage the gears.

2—Many of the radiator compounds on the market are working effectively and stopping minor leaks. We cannot advise the use of a compound of this kind except for a temporary repair of the leak.

3—Some of the compounds will not hurt the radiator or hose in any way while others such as the old remedy of putting bran in the water will in time clog up the cooling system. If the engine block is leaking a compound will not relieve the situation very much.

4—About 6 quarts of oil are necessary to fill the oil reservoir of this engine.

5—The capacity of the gasoline tank is 17½ gallons.

**ELIMINATING CLICKING NOISE**

Q—Can I stop the clicking in my Paterson 6-45 by installing new tappets? The tappets seem to be worn on the bottom and it is hard to keep them adjusted.

2—What makes the air whistle, or sing, as it goes through the carburetor of the Hudson cars?

3—Would putting an extension on the muffler, that is, running a pipe to the rear on a Paterson 6-45 make the car run more silent? Would it collect carbon sooner?—Emerson Kagy, Van Buren, O.

1—It is very probable that the trouble is caused by worn tappets and guides. If the guides are worn, it will do very little good to install new tappets without the guides.

2—If the air going through the carburetor on the Hudson does make any distinctive whistling noise it is something we know nothing about. We believe that you are confusing this sound with the characteristic sound of the engine which varies with type of construction in various makes of cars.

3—Simply lengthening the exhaust pipe will have very little effect on the silence of the engine. Silence is due almost entirely to the design and construction of the muffler and not its location.

**CADILLAC TWO SPEED AXLE**

Q—Should the magnetic latch on the fourth speed on a 1914 Cadillac operate when the lever is pushed forward to on position or does it only operate when the car is in motion? The magnetic latch for starting operates when button is pushed in.

2—Kindly illustrate and explain the

fourth speed operation in full.—F. A. Tolman, Brookline, Mass.

1—It is very important that the rear axle gears should be changed in this model only when the car is in motion.

2—The fourth speed of this Cadillac is obtained through the use of a two speed rear axle, a picture of which is shown in Fig. 7. The two sets of bevel gears are always in mesh, but both are not used at the same time. The rod N, in the illustration controls the position of the bevel gears in the axle. By moving the rod N in, the lowest reduction is obtained, or the large set of gears are in operation. By pulling the rod out, the highest reduction is obtained which means the engine travels faster for a given car speed than with the other set of gears in operation. The electric portion of the control is a means for merely bringing the action of the clutch movement into use when the rear axle ratio is desired to be changed. The means by which this is done is shown in Fig. 8.

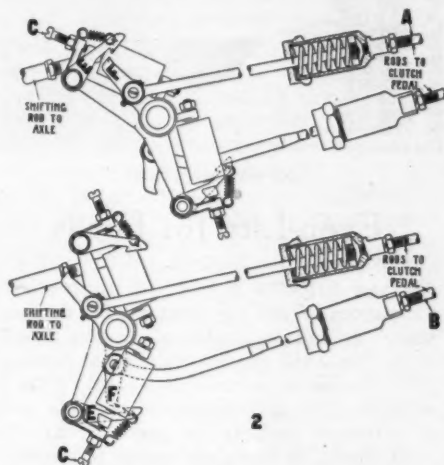


Fig. 8—Magnetic latches on a Cadillac 1914

The switch which is provided, located at the side of the right hand door, is the control for this mechanism. By pushing the switch lever forward, the coil in the control unit pulls on the arm E in both cases, which are shown in the illustration, and allow this hooked lever to engage with the axle shift rod.

**CLUTCH ATTACHMENT**

Q—Is there any attachment that can be put on a one speed Indian twin cylinder cycle so that a clutch and possible low speed can be put on same.—Richard Floyd, Sugarite, New Mexico.

We have no information regarding an attachment of this kind if there is such a thing. You can probably get the desired information from the manufacturers of the motorcycle.

**PAIGE DIFFERENTIAL**

Q—Show construction of a differential and rear end of drive shaft on a 1913-1914 Paige-Detroit roadster.—W. H. Hunt, First Heavy Mobile Repair Shop, Camp Mead, Md.

Shown in Fig. 9.

**REAR AXLE TROUBLE**

Q—A Ross 8 in rent service gives splendid service except the rear axle gears. We are scarcely able to get 1000 miles from the master gear and pinion. The gears are spiral. Would a straight bevel gear be better, or do you advise replacing with a stronger rear axle assembly, if so where can it be secured?—J. M. Dismant, Red Cliff Garage, Red Cliff, Colorado.

It is certainly evident that if it is necessary to replace the gears in the rear axle assembly every thousand miles there is either something radically wrong, or else the construction is not adequate to meet the conditions under which the car is being run. If you find that it is simply because the axle is at fault it would be advisable to install a stronger rear axle assembly. It will be very hard to get an assembly at the present time but you can take the matter up with the various axle manufacturers.

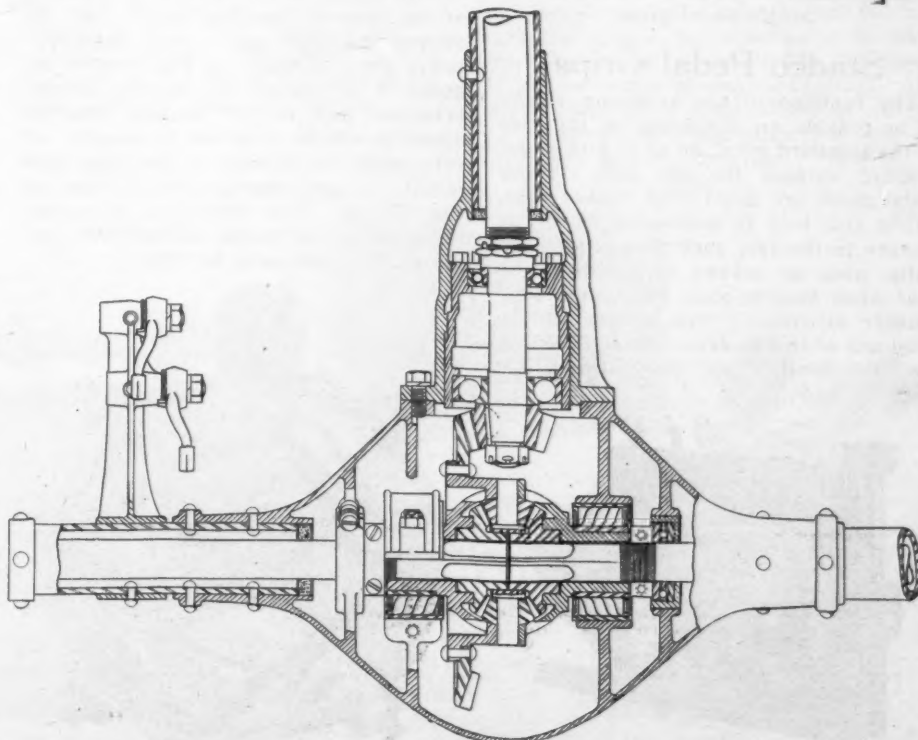


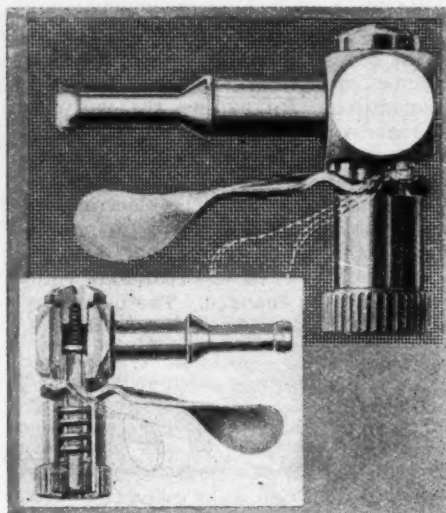
Fig. 9—Sectional view of 1913-1914 Paige Detroit differential

# The Accessory Show Case

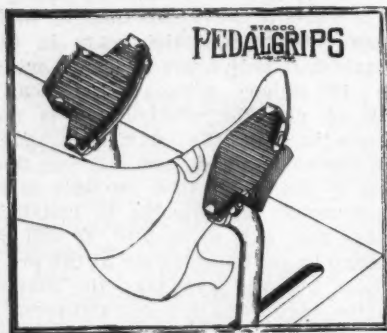
## New Fitments for the Car

### Lox-On Air Chuck

In the average service station today, mechanics are continually in contact with the trouble of having leaky connections in the air lines and particularly at the chuck, which is used to attach the source of air supply to the tire valve. The Lox-On air chuck does not push on over the valve stem, like most other chucks, but simply slips over the valve and by a turn of the lever, the rubber cylinder inside closes like a hand gripping the valve. The rubber cylinder will not wear out easily because it is impossible to force the chuck on. There is also a metal baffle plate, so that the chuck cannot be pushed down beyond the shoulder of the valve stem. The chuck is manufactured by the Automatic Safety Tire Corp., 1765 Broadway, New York, and is listed at \$3.



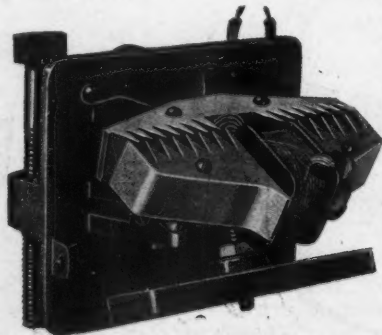
Lox-On air chuck



Stadco pedal grips

### Stadco Pedal Grips

The function of the accessory shown is to provide an extension on the side of the standard pedal, so as to give wider bearing surface for the foot. These pedal grips are faced with rubber caps, which also help to prevent slipping. A feature is the fact that they require no bolts, nuts, or screws in installing, so that when once in place they require no further attention. This is one of the products of the Stadeker Metal Specialty Co., 310 South Canal St., Chicago, and lists for \$1.00.



Evenlite for Fords

### Even-Lite for Fords

The Even-Lite is designed for a Ford car and supplies a light which receives its current from the regular Ford magneto. It can be installed on any Ford, from the 1915 model to present model. This device is a reactance coil, with a variable gap in its magnetic circle and is actuated entirely by the current. It is arranged to work the lamps in parallel and by a proper selection of lamps, it is claimed, they burn to very near full candle power when the car is running at the slowest possible speed. At the slowest possible speed, each light registers about seven volts. The greater the speed of the engine, the shorter the gap becomes, and at the highest possible speed it will be very nearly closed. At this point the voltage at the lamp terminals is only slightly greater than at the lowest. The Even-Lite is manufactured by the Even-Lite Mfg. Co., Paducah, Ky., and sells for \$10.



K. L. timer for Fords

### K-L Timer for Fords

The new timer shown herewith has the following claims made for it: 1, A positive contact of points with spring release; 2, the inner contact points being riveted to the spring which acts as a cushion when contact is made. The contact points are of large size made of a special alloy of metals which is claimed to be equal in conductivity to platinum. It is manufactured by the M-R Company, Lincoln, Nebr., and lists for \$7.

### Strong Transmission Band Adjuster

The transmission band adjuster shown will enable anyone to adjust the brakes in a very short time. These adjusters are made from cold rolled steel, and the pins are pressed in by power press, so there is no danger of them dropping out. This adjuster can be installed without altering the car in any way.



Strong transmission band adjuster

### Cooper Cutout

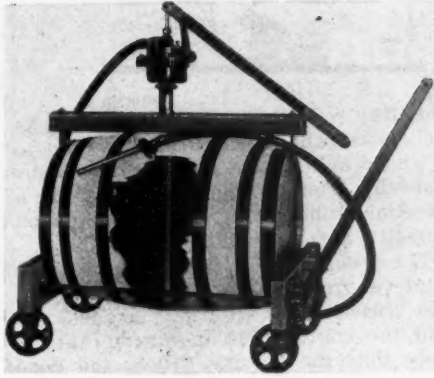
The Cooper cutout, shown herewith, is designed exclusively for use on Buick cars. It is easily attached by just removing the standard plug of the exhaust pipe and screwing cutout in its place. It is made of bronze and bell shaped which increases the volume of sound. The Cooper Mfg. Co., Marshalltown, Iowa, lists this cutout with pedal at \$3.50.



Cooper cutout for Buick cars



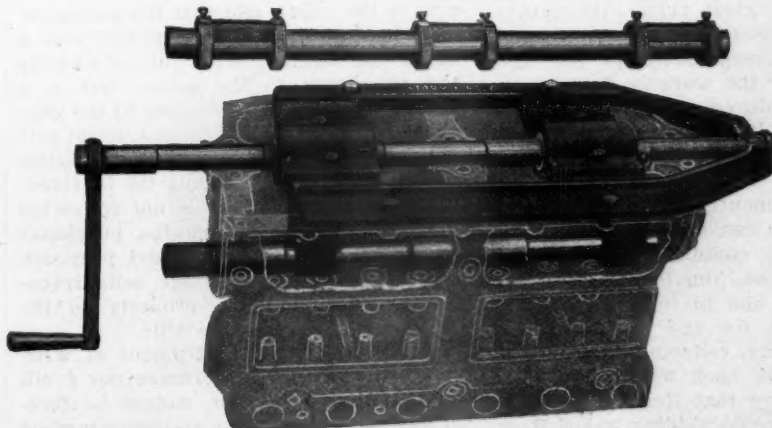
# Service Equipment Time Savers for the Shop



Bennett grease injector

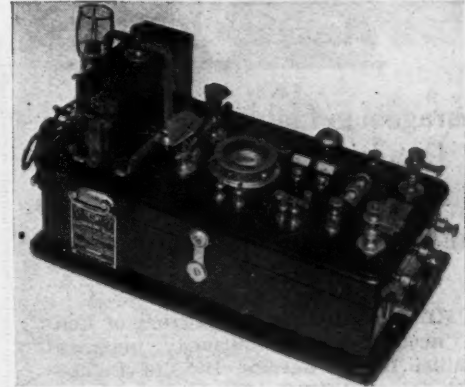
## Storm Main Bearing Replacement Tool

The Storm main bearing replacement tool, illustrated herewith, is a simple and practical tool for bearing work. It consists of a main jig, made heavy and substantial, which is used for holding both the babbitting and boring bars. It obtains its alignment from the camshaft bearing holes by means of ground cam shaft aligning arbor. The babbitting arbor is made smaller than the crankshaft and is provided with specially constructed pouring troughs, giving ample space for the free flow and proper filling of the metal. The boring bar is ground chrome steel provided with three double face and double end cutters, which bores all three bearings at one operation. It is claimed that by the use of this tool, new main bearings can be produced in from twenty to thirty minutes, exactly the same as the original bearings, perfectly aligned and in the exact original position. The manufacturers, the Storm Mfg. Co., 6 Ave. & 4th St. S., Minneapolis, Minn., make this tool in two sizes—one for the Ford and one for the Fordson.



## Gesny Electrical Unit-Tester

The Gesny Electrical Unit-Tester is a portable, self-contained testing device designed to meet the service station demand. This instrument is not only useful in the repair shop but can also be arranged and equipped for the sales counter, enabling the salesman to demonstrate or test any electrical article to the satisfaction of the prospective purchaser. The tester is so designed that practically all electrical equipment which is used in the present day automobile can be tested. By referring to the illustration you will first see the coil test rack, then the spark plug test rack, the lamp test standard, voltmeter, ammeter, an upright lamp situated at the top of the voltmeter, the polarity indicator and two large uprights at the extreme end of the box which are designed to take care of the electrical element contained in the box. It is possible to carry out 101 tests with the aid of this tester and its limits are only confined to the ingenuity of the operator. The price of the outfit shown herewith, which is manufactured by George Edward Smith, 157 West 78th St., New York, is \$40.

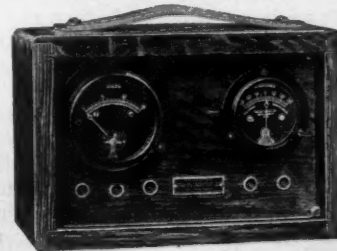


Gesny electrical test unit

## R-S Test Set

The instrument shown herewith is an instrument that is claimed will stand extremely rough usage. The voltmeter reads from 0 to 15 volts and 0 to 150 volts and the ammeter reads from 0 to 30 amperes either way, being known as the center zero type. This outfit is manufactured by the H. E. Phillips & Co., Union City, Ind., and sells for \$25.

Right—R-S test set



Left and right are views of the Storm main bearing replacement tool. Made in two sizes for Ford and Fordson



## Bennett Grease Injector

It will be of interest to all garagemen automobile and truck manufacturers to know that the A. J. Wood Mfg. Co., of Grand Rapids, Mich., has been purchased by the Bennett Injector Co., of Muskegon, Mich. For the past few years the A. J. Wood Mfg. Co. has been manufacturing the Wood's No-Valve Grease Injector which is used for pumping heavy grease direct from original grease barrel into gear cases and transmissions. The Wood's Grease Injector is quickly and simply attached to any grease barrel which is carried on special truck to any part of garage or factory. Quickly and without handling, the grease is applied where needed and with great accuracy as pump throws exactly one-fourth pound of grease per stroke. A special non-drip nozzle instantly stops the flow of grease when through pumping. At the present more than 12,000 of these pumps are in daily operation in all parts of the country.

# Law in Your Business

By Wellington Gustin



## Garageman Liable For Damages Resulting From Negligent Repair Work

### IMPROPER WELDING RESULTS IN ACCIDENT TO ENGINE

THE Supreme Court of Errors of Connecticut has affirmed judgment against Bray's Garage, Inc., of Bridgeport, for negligence in performing a repair job on an automobile of Russell's Express, Inc., of New York.

Russell is engaged in the trucking business as president and treasurer of the corporation. His motor truck broke down in Bridgeport, Conn., and he engaged Bray's Garage to take down the engine. Russell and Bray examined the engine and found that a connecting rod had broken and cracked the lower part of the crankcase. They agreed that a good job could be done upon the case by welding, Bray being a mechanic with a knowledge of welding and Russell understanding automobiles. Other repairs had to be made, besides the welding. Bray secured another to do the welding, with the knowledge and assent of Russell. In setting up the engine, Bray found the upper case cracked, and Russell agreed to have this also welded. Upon its return the welded case was examined and accepted by Bray. The engine was then set up and the car turned over to Russell, as in a first-class condition, ready to make the trip to New York.

Russell did not see the crankcase after it was welded, relying entirely upon the garage keeper's work. There were two cracks, the larger nearly vertical, and the smaller crossing the larger diagonally. The larger crack was properly welded with iron, but the smaller was improperly, negligently and carelessly welded with solder, as the court found. The garage's bill for repairs amounted to \$250, in which was an item of \$18.50 paid to the welder. On the trip back to New York, the soldered crack opened and let out the lubricating oil, the bearings became heated, in consequence of which further repairs had to be made, and the plaintiff lost the use of the car for ten days. The trial court found that the direct cause of the disablement of the truck near Stanford, Conn., and the subsequent loss to the truck owner for its repairs and the hiring of a substitute truck ten days, was that the welding was done in a negligent and improper manner, and gave judgment

*SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty problems as many be submitted to him.*

against the garage owner for such damages.

The garage defended on the grounds that it was not employed to do the welding, but only to employ a competent welder for the truck owner and therefore, the garage keeper having employed a competent welder, it was not responsible for the results of negligent welding. But the court's decision was that the truck owner relied entirely upon the garage to see that the repairing and welding was properly done, and had no dealings with any other person.

The Supreme Court said that when a garage takes a repair job, unless there is an understanding to the contrary, so far as the customer is concerned, it undertakes the whole job for itself. Whether the garage does all the work is quite immaterial. Should the job require work to be done outside the capacity of its shop, as that of a carriage maker, painter, glass cutter, the garage gets the work done on its own account, being equally responsible to the customer, whether the work is done by its immediate employees or by specialists in the different lines of work to be done. The garage company necessarily does all of its work by employees, and whether they are permanently employed or only for special jobs can make no difference.

Further, Bray contended that Russell did not rely upon him for the welding, but authorized him to employ a welder to do the work for and on account of Russell, therefore, relieving Bray of any responsibility for such welding.

The facts were that Russell, knowing that Bray did not do welding, asked Bray if he had a good welder in Bridgeport,

and Bray replied that he had as good as there was, whereupon Bray was told to go ahead and have it done. Bray claims that this conversation amounted to a direction to him to hire the welder upon Russell's account.

The truck was at Bray's garage for whatever repairs were necessary. All that Russell was after was a good job, said the court. The inquiry meant no more than the inquiry, "Have you good mechanics to do the work required on this job?" Welding was a job requiring special skill and tools outside the ordinary garage equipment. It was the garage which was to get the work done, and not the truck owner through the agency of the garage. Besides, the garage gave the truck owner, Russell, an itemized bill charging the welding as an expense item of its own, and not as a charge of the welder to the truck owner. The owner's only interest and only inquiry related to the quality of the work the garage would do.

### WRITTEN SALES AGREEMENT CONSTRUED AS CONDITIONAL SALES CONTRACT AND NOT BILL OF SALE

IN THE case of Kelley against the Overland Sales Co., the Court of Appeals of Georgia had to construe an instrument as a conditional sales contract, although it purported on its face to be a bill of sale by the buyer to seller.

The court said that an instrument executed by the purchaser of personal property to the seller, wherein it is agreed that the title to the property is to remain in the seller until paid for, that the purchaser, upon default of the payment of the notes when due, is to be responsible for the delivery of the property to the seller, and that the purchaser is to hold and possess the property as a bailor for hire, is not a bill of sale by the purchaser to the seller, but is a conditional sale by the seller to the purchaser; the same being a contract of sale with a reservation of title by the seller for the purpose of securing the indebtedness. Such instrument is not converted into a bill of sale from the purchaser to the seller by an additional provision that the purchaser bargains, sells, transfers and conveys the property to the seller and warrants the title.

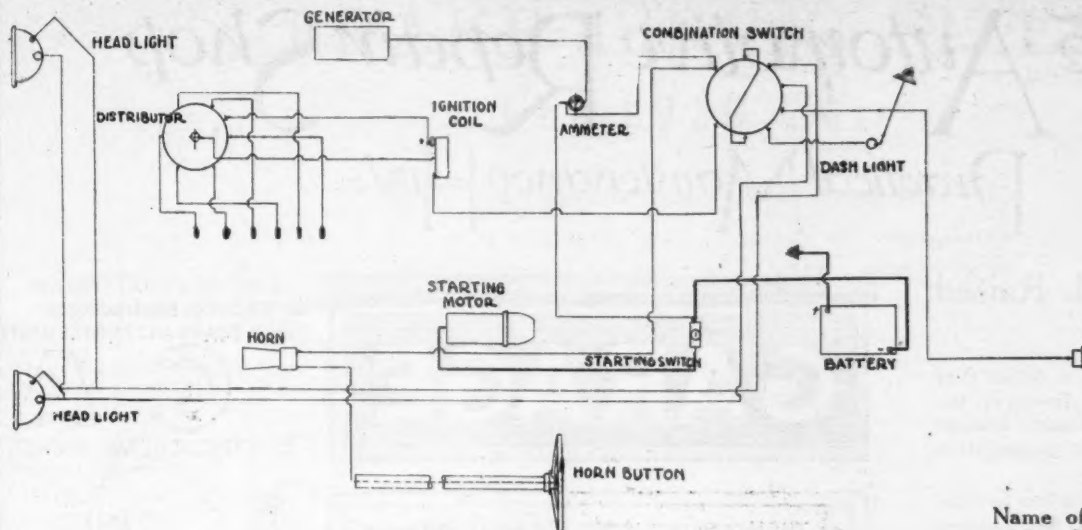
Further, such an instrument of writing, being neither a mortgage nor a bill of sale to secure debt, cannot be foreclosed by the summary statutory method provided in Georgia.



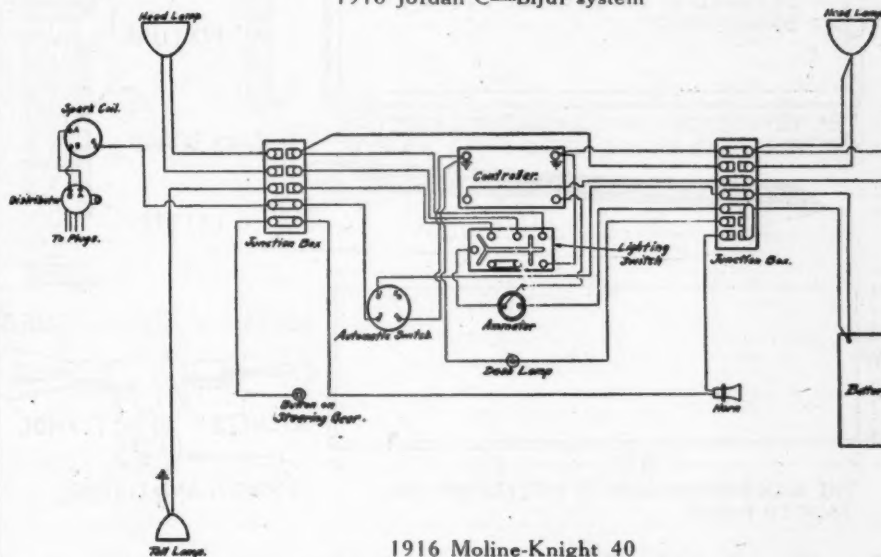
# Motor Age Weekly Wiring Chart No. 87

Name of car and date on which wiring diagrams have appeared in previous issues

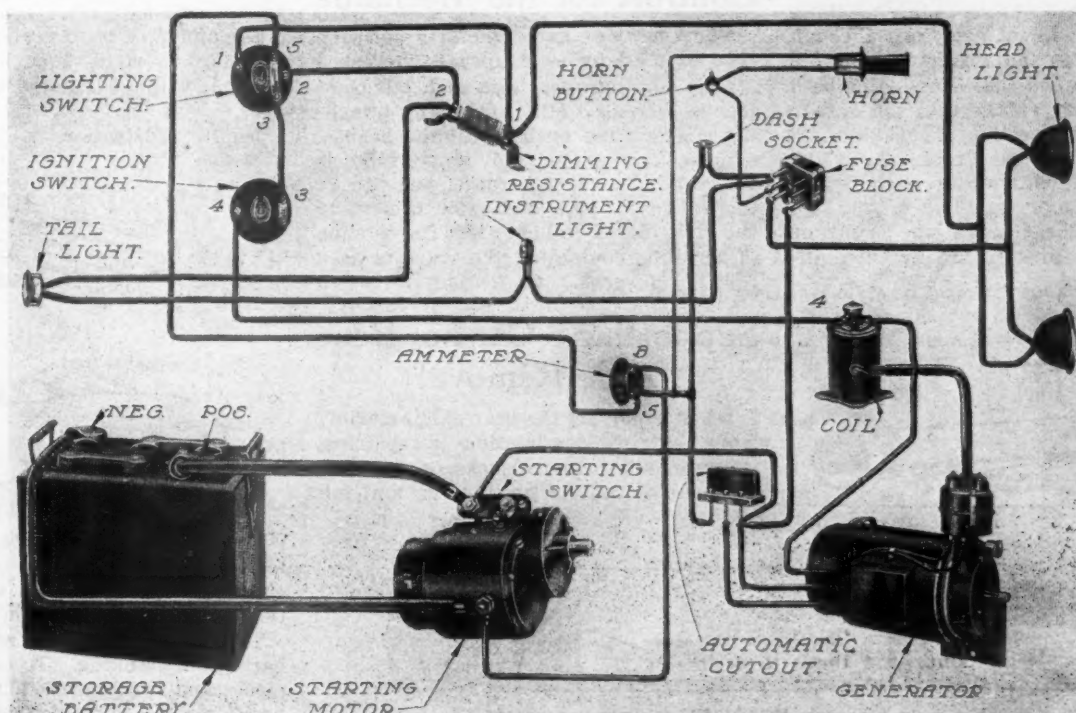
- Allen—June 17, '20
- Briscoe—May 6, '20
- Buick—July 15, '20
- Chalmers—June 17, '20
- Chandler—May 20, '20
- Cole—June 10, '20
- Dodge—July 1, '20
- Elcar—May 6, '20
- Franklin—June 3, '20
- General Battery Charging—Sept. 15, '19
- General Magneto Diagram—June 5, '19
- Harroun—July 15, '20
- Haynes—June 24, '20
- Hupmobile—May 27, '20
- Internal Connections—July 10-17-24, '19
- Jeffery—May 13, '20
- Jordan—June 10, '20
- King—May 20, '20
- Kissel—May 27, '20
- Locomobile—June 6, '20
- Moline-Knight—May 20, '20
- Moon—July 8, '20
- Peerless—May 13, '20
- Pierce-Arrow—July 15, '20
- Studebaker—July 1, '20
- Stutz—July 8, '20
- Special Systems for Fords—May 15-22, '19



1918 Jordan C—Bijur system



1916 Moline-Knight 40



Reo 1918

# The Automotive Repair Shop

## Practical Maintenance Hints

### Garage Sign With Raised Lettering

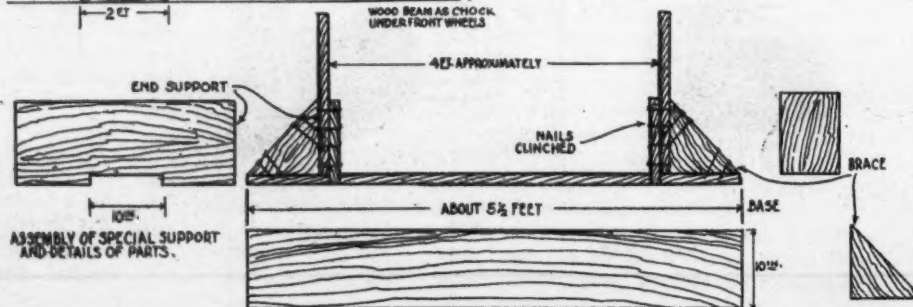
The sign for a garage is a detail that is not given much attention, however, the returns from this advertising feature justify some thought in the preparation of this conspicuous detail.

A sign with raised lettering has several advantages over the usual flat painted type. It can be illuminated better and stands out more prominently in either daylight or under electric light. Repainting can be done yearly or more often by the least experienced painter. The raised letters require no skill to obtain sharp distinct outlines when painting and the raised lettering makes it legible at a longer distance.

The construction of a raised letter sign is not difficult, and the individual letters can be cut out of a piece of beech or out of fiber board as is used in the construction of automobile bodies.

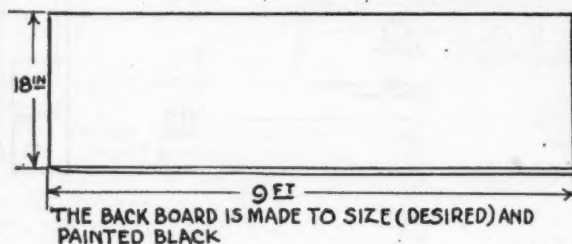
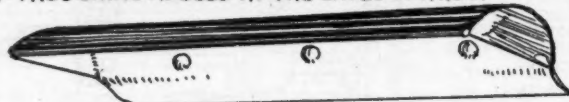
These letters are thoroughly painted on all sides before attaching to the back-ground. This makes them practically weatherproof. The backboard can be of beech wood or oak as desired. The ground color should be black and the moulding or border white, inasmuch as this white lettering on a black back-ground stands out more conspicuously. Brass nails or brads should be used to attach the letters and moulding as these last longer without rusting through when exposed to the weather.

A simple method that illuminates both the sign and the entrance to the garage is by means of a section of troughing as used at the eaves of a roof. Paint the inside of this with white enamel and secure to the upper molding of the sign as shown in the illustration. Four or six lights and sockets are mounted inside.

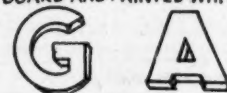


THE Moulding IS PAINTED WHITE AND SECURED TO OUTER EDGES OF THE BACK BOARD

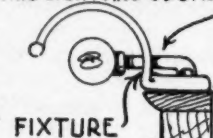
THE REFLECTOR FOR ILLUMINATION IS A SECTION OF TROUGHING AS USED AT THE EAVES OF A ROOF



THE INDIVIDUAL LETTERS ARE SAWED OUT OF BEECHWOOD OR FIBER BOARD AND PAINTED WHITE

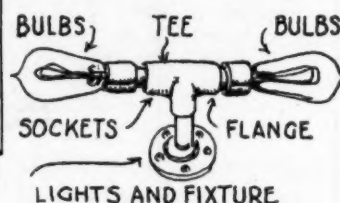


ELECTRIC LIGHT AND SOCKET



BACK BOARD

LETTER



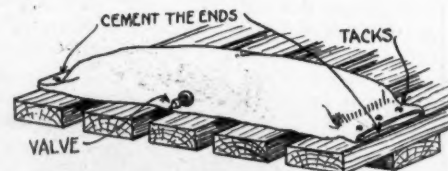
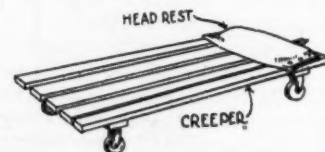
### Comfort for the Mechanic

The service and comforts of the creeper used by mechanics is increased by the addition of a head rest, but comfort is increased still further by attaching a pneumatic cushion for the head.

A section of an old inner tube is serviceable for this purpose, and can be tacked on at each end after cementing the ends closed to hold air. The portion of the tube containing the valve is used for this purpose.

without interference with the truss rods, brake rods and other connections. Another difficulty is to set the supports so the car is rigid enough for working around without danger of it toppling over.

In the illustration, a supporting base



is shown that is simple to construct and affords rigidity sufficient to make it safe enough so the mechanic will not topple the car when bolting the axle up.

This support is made of oak or other hardwood planking. It consists of five pieces and two braces. The uprights are positioned to rest against the running board supports. This leaves the inside space clear for the mechanic to work in, and the axle assembly can be slid out and in without interference.



# BRAKE LINING SIZES

## For 1920 Cars

### Motor Age Maintenance Data Sheet No. 106

One of a series of weekly pages of information  
valuable to service men and dealers—save this page

Name and Model	Length	External Width	Thick-ness	Length	Internal Width	Thick-ness	Name and Model	Length	External Width	Thick-ness	Length	Internal Width	Thick-ness
Ace, LL							Maibohm, B	37 1/2	1 3/4	5/32	35 1/4	1 3/4	5/32
Allen, Series 43	38 3/8	1 3/4	5/32	34	1 3/4	5/32	Martin-Wasp						
American, C-6	43	2	3/16	42	2	3/16	Marmon, touring,						
Amer. Beauty, 6-55	26	3	5/16	26	3	5/16	34 B	47	2	3/16	54	1 1/2	3/16
Anderson, 30	43 1/2	2	5/32	41 7/8	2	5/32	Maxwell, 1920						
Apperson, 821-S	48 1/2	2 1/4	3/16	44 3/4	2	3/16	McFarlan, 127						
Apperson, Anniversary							Mercer, Series 5						
Auburn, 639 H-K	43 1/2	2	3/16	41 7/8	2	5/32	Meteor, K & R						
Argonne, 1920	48	2 1/4	3/16	20	2 1/4	3/16	Metz, M 6	42	1 3/4	3/16	20	1 3/4	3/16
Biddle, B 1							Mitchell, 7-40	40 3/4	2	3/16	40 3/4	1 1/4	3/16
Bour-Davis, 20							Monitor, S-3						
Bour-Davis, 21 S	43	2	3/16	43	2	3/16	Monroe, S-9 & S-10	35	2	1/8	31 7/16	1 3/4	1/8
Brewster, 1920							Moon, 6-48	41	1 3/4	3/16	41	1 1/2	3/16
Briscoe, 4-34	29	2	9/64				Moon, 6-68						
Buick, K 6-45	21 1/2	2	9/64				Moore, 30 G	37	1 3/4	3/16	35 1/2	1 3/4	3/16
Buick, K 6-49	43 1/16	1 7/8	5/32	40 15/16	1 5/8	5/32	Nash, 682						
Bell							Nash, 681-6						
Cadillac, 59	53 1/2	2 1/2	3/16	49	2 1/2	3/16	Nash, 684						
Case, V	48	2 1/2	5/32	46 5/8	2 1/4	5/32	National Sextet, BB	48	2 1/2	5/32	46 5/8	2 1/4	5/32
Chalmers, 6-30	43 1/2	1 3/4	3/16	41 3/4	1 1/2	3/16	Nelson, D	33	1 1/4	5/32			
Champion, C 4							Norwalk, A 30 K						
Chandler, 27	45 1/8	2	3/16	38 1/2	1 3/4	3/16	Noma, 1 B						
Chevrolet, 490							Oakland, 34-C	35 1/8	1 7/8	5/32	35	1 5/8	5/32
Chevrolet, F B							Ogren, 6-60						
Cleveland, 40	21 3/8	1 1/2	5/32				Oldsmobile, 45-B						
Cole, 870	38	2	5/32				Oldsmobile, 37-A						
Columbia, D-C & CS	44	1 3/4	3/16	41 3/4	1 1/2	3/16	Olympian, 45	37 7/16	1 3/4	5/32	35 1/2	1 3/4	5/32
Comet, C-53							Overland, 4						
Commonwealth, 42	37 7/16	1 3/4	5/32	35 1/4	1 3/4	5/32	Owen Magnetic, 60						
Crow-Elkhart, L 53-55							Packard, 335	53 5/64	2 1/2	1/4	21 5/32	2	3/16
Crow-Elkhart, H 53-55							Paige, 6-42	37 1/8	2	3/16	35 1/4	2	5/32
Cunningham, V-4	54	2 1/2	3/16	54	2 1/2	3/16	Paige, 6-55	44	2	3/16	42	2	3/16
Douglas, G	46	2	3/16	44	2	3/16	Paterson, 647						
Daniels, D 19	48 3/4	2 1/2	3/16	44 3/4	2 1/2	3/16	Peerless, 56	19 1/4	2 1/4	3/16			
Davis, 51-55	44 5/16	2	3/16	40 7/8	2	5/32	Piedmont, 6-30						
Dispatch, G							Piedmont, 6-40	16	2	3/16	14	3	3/16
Dixie Flyer, H-S-70	19 1/4	2 1/4	3/16	14 3/4	1 3/4	3/16	Pierce-Arrow, 31	18 3/16	3 1/4	3/16	16 7/8	3	3/16
Dodge Brothers							Pierce-Arrow, 51	20 7/8	3 1/4	3/16	19 1/8	3	3/16
Dorris, 6-80	47 1/2	2 1/2	3/16	47 1/2	2 1/2	3/16	Pilot, 6-45						
Dort, 15	35 3/8	1 5/8	9/64	35 3/4	1 5/8	9/64	Porter, 45						
Dupont, A	47 1/2	2 1/2	3/16	47	2 1/2	3/16	Premier, 6-D	49 5/8	2 1/4	5/32	19 9/16	2 1/4	5/32
Economy, 646							R. & V. Knight, R						
Elcar, 4	35 1/4	2	3/16	38	2	3/16	R. & V. Knight, J	21 5/8	2 1/2	3/16	20 7/8	2 1/2	3/16
Elcar, 6	35 1/4	2	3/16	38	2	3/16	Reo, T-6	43	2	3/16	39	2	3/16
Elgin, K	43 7/8	2	5/32	39	1 3/4	5/32	Revere, C	42	2 1/4	1/4	42	1 1/2	3/16
Essex, A	20 3/16	1 3/4	3/16	42 1/2	1 1/2	3/16	Roamer, C-6-54						
Ferris							Roamer, D-4-75						
Ford, T	23 5/16	1 1/8	5/32				Saxon, 125						
Franklin, S 9-B	28	2 5/8	5/32	23 7/8	3	3/16	Sayers Six, S P	42 9/16	2	5/32	17 1/4	2	5/32
Gardner							Scripps-Booth, B-39	35 1/8	1 7/8	5/32	35 3/8	1 5/8	5/32
Geronimo, 6-E 45	37	1 3/4	3/16	36	1 3/4	3/16	Seneca, L	39	1 3/4	3/16	36	1 3/4	3/16
Grant Six, HX	38 3/8	1 3/4	5/32	34	1 3/4	5/32	Severin Six						
Hanson, 54							Singer, 20						
Harroun, AA-2							Skelton, 35						
Haynes, 47							Spacke, S 20						
H. C. S.							Standard 8, I	16 3/4	2 1/2	3/16	16 3/4	1 1/4	3/16
Hollier, 206-B							Stanley Steamer						
Holmes	28 13/16	3	1/4	41 1/2	2 1/2	1/4	Stearns, SKL4						
Hudson, O	22 1/4	2 1/2	3/16	20 3/8	2 1/2	3/16	Stephens, 80	42 9/16	2	5/32	17 1/4	2	5/32
Huffman Six, R	44	2	3/16	42	2	3/16	Studebaker, EJ-40						
Hupmobile, R	33 1/8	2	5/32	33 7/8	1 3/4	1/8	Studebaker, EH-50	46 3/4	2	5/32	43 1/4	1 3/4	5/32
Jordan, M	20 3/16	1 3/4	3/16	42 1/2	1 1/2	3/16	Studebaker, EG-60						
Jackson, 638	35 1/4	2	5/32	15 3/4	2	5/32	Stutz, H						
Jones, 28	49 5/8	2 1/4	5/32	44 1/4	2 1/4	5/32	Templar, A-445						
King, H	48	2 1/2	5/32	46 5/8	2 1/4	5/32	Texas						
Kissel, 45	44 1/4	2	3/16				Tulsa, E-1	43	2	3/16	42 1/2	2	3/16
Klinekar, 6-55-J	53	2	3/16	31	1 3/4	3/16	Velle, 48	19 13/16	1 3/4	3/16	42 1/2	1 1/2	3/16
LaFayette	58	2 1/2	3/16	51 11/16	2 1/2	3/16	Velle, 34						
Leach, B-W							Vogue, 655						
Lexington, S 20	45	2	5/32	24 1/4	2	5/32	Vogue, 666						
Liberty, 10-C	20 3/16	1 3/4	3/16				Westcott, C-48	22 1/4	2 1/2	3/16	20	2 1/2	3/16
Locomobile, 43	14 15/32	2 1/2	3/16	48 5/8	3	3/16	Westcott, C-38	20 1/4	1 3/4	3/16	42 1/2	1 1/2	3/16
Lorraine							Willys-Knight, 20	44	2 1/4	3/16	13	2 1/4	3/16
							Winther, 61						
							Winton, 25	53 1/2	2 1/2	3/16	49	2 1/2	3/16

## Some Better Ways of Doing Work in the Tire Repair Shop

### Tube Testing Apparatus

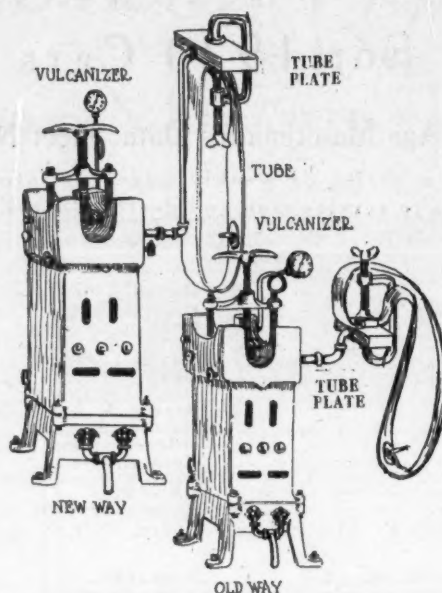
When testing a tube for air leaks it is surprising how much assistance in supporting the tube, a hook, such as that shown, is. The proper location for the testing tank is naturally in a window and so the hook, which is just a piece of  $\frac{1}{4}$ -in. round stock bent to shape, is suspended from the top casing of the window. Small brace rods run out to the hook from either side of the window to steady it. It should be noted that this apparatus does not interfere with raising or lowering the window. The obvious advantages of the hook are that it keeps the tube practically round and leaves both hands free for rotation of the tube and inspection for punctures.

### The Advantages of an Inverted Tube Plate

There is nothing theoretical about the disadvantages of the ordinary tube plate and this little kink eliminates them with no disadvantages.

Every tire man is familiar with the disadvantages of the ordinary tube plate. When a tube is placed upon it the remainder of the tube must be held away from the plate or it may become cured at whichever points may happen to fall into contact with the plate. The usual method of preventing this is to drape the tube over the clamp as best he can, but this is a cumbersome, makeshift method. There is always the likelihood that the tube will slip off or be knocked off of its draped position and fall on the plate. Besides, the draping greatly limits the capacity of the plate.

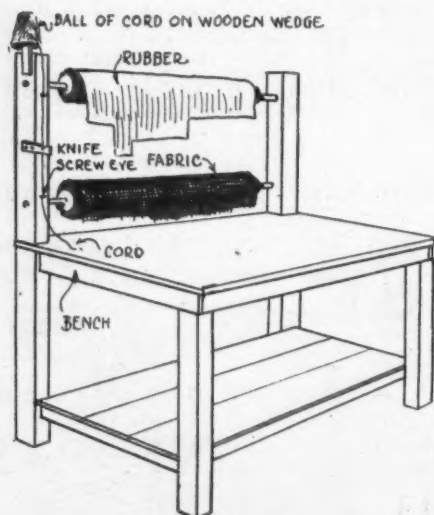
All these evils may be avoided by inverting the tube plate, in which case the plate would be raised about five feet from the floor and turned upside down. This height is not only a convenient one



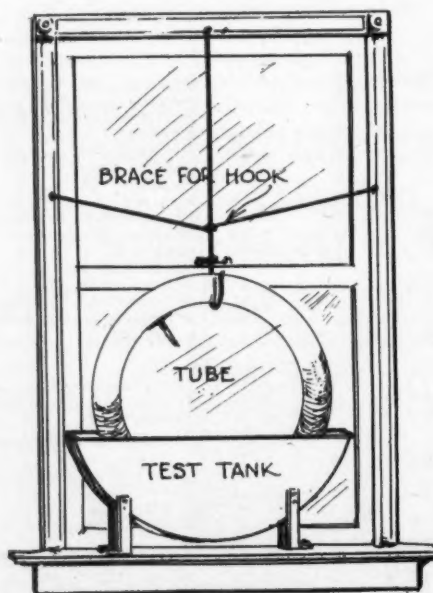
Inverting the tube plate will keep the tube from coming into contact with the plate

to work at but it allows the tubes to hang free of the floor, a thing that is not possible in the usual location. In the inverted position there is little chance of going wrong in putting a tube on. It is simply clamped in place and allowed to hang. There is no worry about any other part of the tube being burned, since it hangs free and clear. Furthermore, about twice as many tubes may be accommodated since the danger of disturbing the draping of tubes already in place is absent.

In making the change practically all that is needed is a long pipe running from vulcanizer to tube plate, and some sort of a support for the plate. Usually it may be bracketed to the wall. McMinn Tool Co., Bridgeport, Conn.



A handy bench to keep materials ready for use. The shelf below to be used for storing additional material. The pipes carrying the rolls can be slipped out when a new roll is put in place



Holding a tube being tested for air leaks. A window being the best place to do this work; here is shown a rigging which is very handy

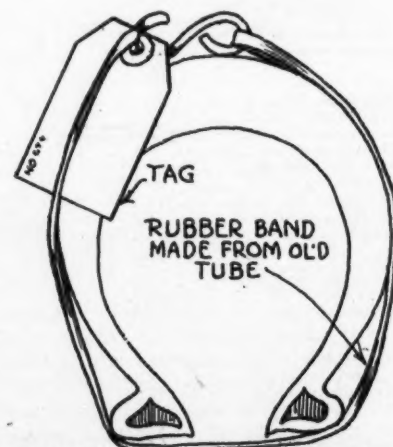
### Fastening Tags to Tires

Properly marking or identifying a tire so that it will not become lost while it is being repaired is somewhat of a problem. The ordinary method is to tie the tag to the tire with a piece of string. This serves fairly well, but there is always the danger of the string breaking and, of course, it takes an appreciable time to measure off a length from the ball, break it, thread it through the eyelet in the tag and then tie it around the tire. To save time and at the same instant provide a more secure fastening for the tag a figure 8 wire hook with a rubber band attached to it, is suggested. The rubber band is made from cutting a slice off of an old tube. The tag is slipped onto the free end of the hook, then the rubber band is passed around the tire and the free end of the band is caught in the free end of the hook. The hook then lies flat on the tread of the tire holding the card flat also.—McMinn Tire Co., Bridgeport, Conn.

### Keeping Twine Handy

A ball of cord or twine conveniently placed is of use around any shop and particularly a tire shop. It may be used for tying up tubes, attaching tags to tires and tubes and in various other ways. If a conical ball of cord is used, as illustrated, it may be mounted on a small wooden wedge which enters a hole in its center. To aid in cutting the cord a section of a hacksaw blade with a notch cut in it is mounted on the side of the bench. The notch, of course, is sharpened.

Incidentally the bench shown is an approved type for use as a material rack. Rolls of rubber and fabric are mounted on the back and the table is used for cutting off pieces from the rolls. The shelf underneath is for the storage of additional tire repair material. The rolls are mounted on pipes, which can be slid out when a new roll is to be put in place.—McMinn Tire Co., Bridgeport, Conn.



HOOK AND TAG LIE FLAT ON TIRE

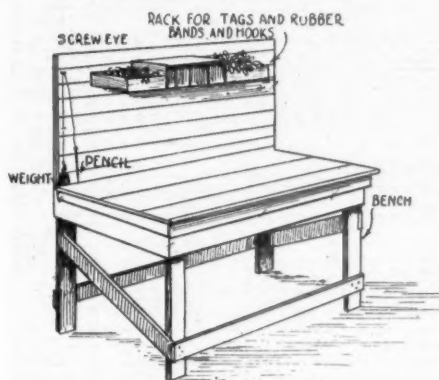
A good manner of fastening tags to tires being repaired or in stock. A tag can be attached to a tire in much shorter time by this method than with twine



## Preventing Buffer Vibration

To insure absence of vibration and noise of a buffer the direct driven type with electric motor mounted in the head is, of course, ideal, but its cost, although not unreasonable, often makes it unavailable. At the same time the vibration of the belt-driven type is often objectionable, particularly in tire repair shops where the shop is generally at the rear of a store over which there are tenants. Such a shop usually has a wood floor. This is the cause of a large amount of the vibration inasmuch as it does not provide a sufficiently solid foundation for the buffer.

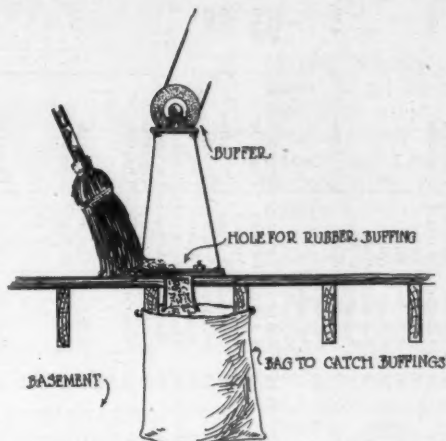
Vibration can be reduced to an unobjectionable degree by mounting it on a brick pier, as shown. The pier top is built flush with the floor and lies between two of the floor joists. The pier rests on the basement floor and consequently the vibration is not only greatly reduced by this solid support, but whatever vibration that does occur is absorbed by the ground and consequently is not noticed by the tenants.—McMinn Tire Co., Bridgeport, Conn.



Much time spent looking for the pencil can be saved by this suggestion

## Keeping the Pencil in Place

It often happens in the shop that just when tags are to be marked or memorandums to be made there is no pencil at hand. This is invariably true where men work in shirt and trousers and not in overalls, and so have no good place to carry a pencil. A solution of the difficulty is to use a pencil with a string and



A simple way to dispose of rubber buffings

a small weight attached to it, the string passing through a small screw eye about three feet up on the wall. When the pencil is used the weight is raised, with the consequence that as soon as the pencil is released from the grasp it flies back to its former position.—McMinn Tire Co., Bridgeport, Conn.

## Disposal of Rubber Buffings

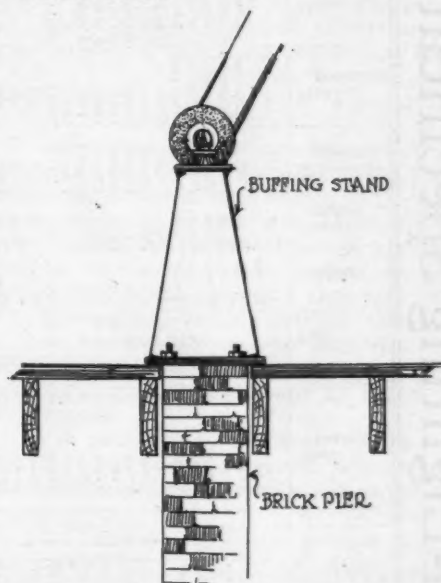
In buffing tires quantities of rubber dust soon collects around the base of the buffer, not only causing inconvenience to the workman, but constituting dirt which is soon tracked all over the shop. Obviously this is objectionable, but particularly so because dust interferes with repair work, settling on and sticking to the cement on tires which have been torn down and are drying before being built up. The use of a hood over the buffing wheel in conjunction with a suction fan is the ideal way of eliminating this evil, but unfortunately it is too expensive for many shops. A simple alternative which works well is to cut a hole in the floor about three inches square at the point where the dust falls. When a small pile of dust collects around the hole it should be swept into it. The dust may be allowed to fall on the basement floor, or into a large box placed on the floor or a bag may be attached to the floor joists as illustrated. Whenever possible the buffing should be done in a room apart from the main shop. McMinn Tire Co., Bridgeport, Conn.

## Electric Buffer

The usual buffing machine has places for two wheels, yet the average tire shop and particularly retreading shops require at least four wheels, a large emery wheel, a disk emery, a wire brush and a rotary rasp. Where there is only room for two of these a certain amount of time must be spent in changing wheels.

It is a simple matter to mount all the wheels on a single shaft driving them directly from the electric motor as shown. The details of the mounting will be left to individual choice. There are several methods of doing it and each man will have his own preference. There is a bearing between each pair of wheels, supported by a hanger made out of flat iron stock, or regular shafting hangers, inverted, may be used.

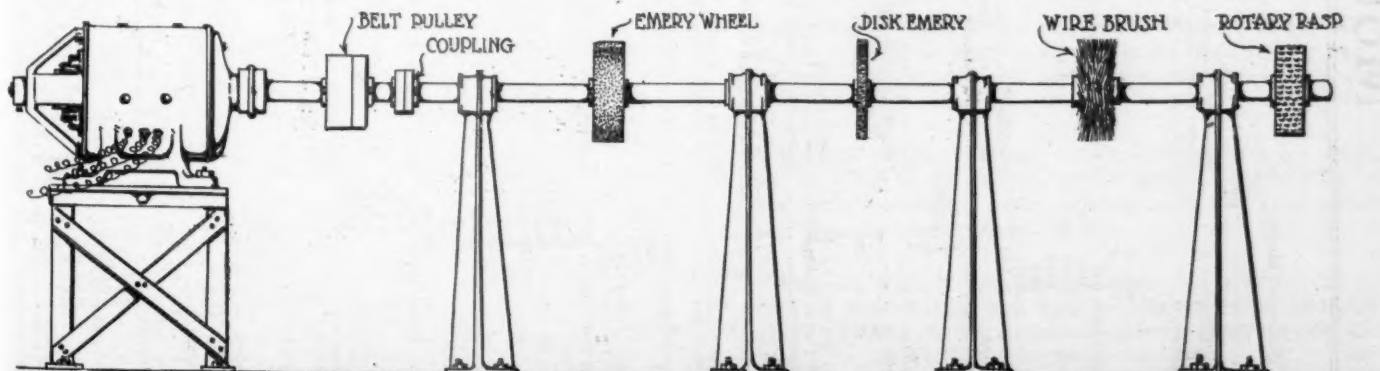
The speed of the average motor is somewhere around 1750 for driving the wheels direct.



Preventing buffer vibration by mounting on a brick pier resting on basement floor

The belt pulley is retained so that any other machinery, such as an air compressor, may be driven as usual.

The mounting shown has its advantages, regardless of the number of wheels used, for it changes the buffer drive from belt to direct, thus eliminating much noise and vibration. This is the ideal way, except that changing wheels is more difficult.



Mounting the emery wheel, disk emery, wire brush and rotary rasp on a single shaft

## Motor Age Farm-Lighting Specification Tables

Name and Model	Maker	Watts	Capacity	No. 20 watt lamps	Lamp voltage	No. cyls	No. cycles	Make of engine	Horsepower	Fuel	Cooling	Power pulley	Generator drive	Make of generator	Make of battery	Battery amp. hours	Battery volt.	No. cells	Starting engine	Stopping engine	Governor type	Price
Aerothrust	Aerothrust Engine Co., La Porte, Ind.	1000	15-25	15-25	40	2	4	Ida	2	G	Water	Opt.	Direct	Imperial	Universal	60	28-42	16	S-Auto	S-Auto	Throttle	550
Alamo	Alamo Farm Light Co., Omaha, Neb.	1000	75-120	75-120	32	4	4	Ovn	2	G	Water	Yes	Belt	Imperial	Universal	130	32	16	S-Auto	S-Auto	Throttle	600
Cushman, A	Cushman Motor Works, Lincoln, Neb.	1000	26-76	26-76	32	4	4	Ovn	4	G	Water	Yes	Belt	Imperial	Universal	175	32	16	S-Auto	S-Auto	Throttle	675
E		1000	35-85	35-85	32	4	4	Ovn	4	G	Water	Yes	Belt	Imperial	Universal	260	32	16	S-Auto	S-Auto	Throttle	
Delco-Light, 508	Delco-Light Co., Dayton, Ohio	1250	52-102	52-102	60	2	4	Ovn	20	G-K	Water	Opt.	Belt	Imperial	Universal	100	60	30	S-Auto	S-Auto	Throttle	
110-volt		500	25	25	32	4	4	Ovn	1	G-K	Water	No	Direct	Ovn	Exide	80	32	16	S-Auto	S-Auto	Battery	
216		500	25	25	32	4	4	Ovn	1	G-K	Water	No	Direct	Ovn	Exide	160	32	16	S-Auto	S-Auto	Battery	
1016		750	37	37	32	4	4	Ovn	1	G-K	Water	No	Direct	Ovn	Exide	160	32	16	S-Auto	S-Auto	Battery	
320		2500	50	50	32	4	4	Ovn	5	G-K	Water	No	Direct	Ovn	Exide	160	112	56	S-Auto	S-Auto	Battery	
332		3000	150	150	32	4	4	Ovn	5	G-K	Water	No	Direct	Ovn	Exide	160	32	16	S-Auto	S-Auto	Battery	
Dyneto, L-4-F-160	Dyneto Electric Co., Syracuse, N.Y.	1250	16-66	16-66	32	1	4	New Way	4	G & K	Water	Yes	Chain	Ovn	Phila.	95-275	32	16	S-Auto	S-Auto	Throttle	700
Everlite	Black Swan Co., Minneapolis, Minn.	1000	75-150	75-150	32	1	4	Ovn	3	K	Water	Yes	Belt	Ovn		120	32	16	S-Auto	S-Auto	Throttle	540-670
Fairbanks-Morse, F-3-46	Fairbanks-Morse & Co., Chicago	600	40	40	32	1	4	Ovn	3	K	Water	Yes	Belt	Ovn		160	32	16	S-Auto	S-Auto	Throttle	
F-3-100		900	65	65	32	1	4	Ovn	3	K	Water	Yes	Belt	Ovn		160	32	16	S-Auto	S-Auto	Throttle	
F-6		3500	200	200	32	1	4	Ovn	6	G & K	Water	Yes	Belt	Ovn		200	32	24	S-Auto	S-Auto	Throttle	595
Fairmont, B-4	Fairmont Gas E. & R. M. Co., Fairmont, Minn.	1000	22-73	22-73	32	1	4	Ovn	2	G & K	Water	Yes	Belt	Ovn	Edison	80	32	16	S-Auto	S-Auto	Throttle	
Genco, A	General Gas-Electric Co., Hanover, Pa.	1000	36-87	36-87	32	1	4	Ovn	2	Any	Water	Yes	Direct	Ovn	Ovn	110	32	16	S-Auto	S-Auto	Throttle	
B		3000	155-205	155-205	110	2	4	Ovn	5	G	Water	Yes	Direct	Ovn	Ovn	110	110	54	S-Auto	S-Auto	Throttle	
D		3000	204-243	204-243	110	2	4	Ovn	5	G	Water	Yes	Direct	Ovn	Ovn	110	110	54	S-Auto	S-Auto	Throttle	
Gray & Davis, L-350	Boston, Mass.	350	25	25	32	1	4	Ovn	2	G-K	Water	Opt.	Direct	Ovn	Columbia	80	6	3	S-Auto	S-Auto	Electro-sole	450
Holt Power-Light, 110-volt	Automatic Light Co., Inc., Ludington, Mich.	750	30	30	110	1	4	Ovn	2	G-K	Water	Opt.	Direct	Ovn		120		16	S-Auto	S-Auto	Electro-sole	
Independent, A	Independent Light & Power Co., Oelwein, Iowa				40	1	4	Ovn	4		Water		Direct	Ovn					S-Auto	S-Auto		
C					40	1	4	Ovn	4		Water		Direct	Ovn					S-Auto	S-Auto		
Jupiter, 3	Perfection Storage Battery Co., Chicago	600	55	55	32	1	4	Opt.	2	K	Water	Yes	Belt	Ovn	Ovn	80	32	16	S-Auto	S-Auto	Throttle	*335
6		1000	67	67	100	1	4	Opt.	2	K	Water	Yes	Belt	Ovn	Ovn	80	32	16	S-Auto	S-Auto	Throttle	*610
Kohler	Kohler Co., Kohler, Wis.	1250	62	62	32	1	4	Ovn	3	G	Water	No	Direct	Ovn	Willard	95	24	12	S-Auto	S-Auto	Throttle	595
Lalley Light	Lalley Light Corp., Detroit	1250	62	62	32	1	4	Ovn	3	G	Water	No	Direct	Ovn	Willard	80-115	32	16	S-Auto	S-Auto	Throttle	595
Lauson-Edison, 301	John Lauson Mfg. Co., New Holstein, Wis.	800	730	730	50	1	4	Opt.	2	Opt.	Water	Opt.	Belt	Ovn	Edison	38	52	26	Manual	Manual	Throttle	
202-30		400	15-54	15-54	25	1	4	Opt.	2	Opt.	Water	Opt.	Belt	Ovn	Edison	38	52	26	Manual	Manual	Throttle	
206-110		500	10-25	10-25	30	1	4	Opt.	1	Opt.	Water	Opt.	Belt	Ovn	Edison	40	30	15	Manual	Manual	Throttle	
Lauson Junior, 301		500	15-40	15-40	30	1	4	Opt.	1	Opt.	Water	Opt.	Belt	Ovn	Edison	40	30	15	Manual	Manual	Throttle	
Langstadt-Meyer, D-4	Langstadt-Meyer Co., Appleton, Wis.	750	37	37	32	1	4	Opt.	1	Opt.	Water	Opt.	Belt	Ovn	Edison	40	30	15	Manual	Manual	Throttle	
D-1		1000	50	50	32	1	4	Ovn	4	G & K	Water	Yes	Direct	Ovn	Willard	112-196	32	16	S-Auto	S-Auto	Throttle	
B-1 1/2		1500	75	75	32	1	4	Ovn	4	G & K	Water	Yes	Direct	Ovn	Willard	112-196	32	16	S-Auto	S-Auto	Throttle	
B-1 1/2		1500	75	75	32	1	4	Ovn	4	G & K	Water	Yes	Direct	Ovn	Willard	112-196	32	16	S-Auto	S-Auto	Throttle	
D-3 1/2		1500	75	75	32	1	4	Ovn	4	G & K	Water	Yes	Direct	Ovn	Willard	112-196	32	16	S-Auto	S-Auto	Throttle	
D-4		3000	150	150	110	1	4	Ovn	8	G & K	Water	No	Direct	Ovn	Willard	112-196	110	56	S-Auto	S-Auto	Throttle	
2C-4		4000	200	200	110	1	4	Ovn	8	G & K	Water	No	Direct	Ovn	Willard	112-196	110	56	S-Auto	S-Auto	Throttle	
D-5		5000	250	250	110	1	4	Ovn	8	G & K	Water	No	Direct	Ovn	Willard	112-196	110	56	S-Auto	S-Auto	Throttle	
D-6		6000	300	300	110	1	4	Ovn	8	G & K	Water	No	Direct	Ovn	Willard	112-196	110	56	S-Auto	S-Auto	Throttle	
2C-6		6000	300	300	110	1	4	Ovn	8	G & K	Water	No	Direct	Ovn	Willard	112-196	110	56	S-Auto	S-Auto	Throttle	
Main, Power Light, MCF	Main Electric Co., Cleveland	500	25	25	32	1	4	Opt.	1	Opt.	Water	Yes	Belt	Ovn	Ovn	90	32	16	S-Auto	S-Auto	Throttle	350
I-CF		800	40	40	32	1	4	Opt.	1	Opt.	Water	Yes	Belt	Ovn	Ovn	90	32	16	S-Auto	S-Auto	Throttle	440
I-CXF		1000	50	50	32	1	4	Opt.	1	Opt.	Water	Yes	Belt	Ovn	Ovn	140	32	16	S-Auto	S-Auto	Throttle	500
3-EF		2000	100	100	32	1	4	Opt.	1	Opt.	Water	Yes	Belt	Ovn	Ovn	235	32	16	S-Auto	S-Auto	Throttle	800
13-CF		2500	100	100	32	1	4	Opt.	1	Opt.	Water	Yes	Belt	Ovn	Ovn	235	110	16	S-Auto	S-Auto	Throttle	875
Marco, H	Marco Light & Power Corp., Chicago	1500	95-107	95-107	32	1	4	New Way	5	Opt.	Water	Yes	Chain	Ovn	Ovn	112-150	32	16	S-Auto	S-Auto	Throttle	675-705
Matthews, JR	Matthews Engineering Co., Sandusky, Ohio	300	15	15	32	1	4	Ovn	1	G	Water	No	Direct	Ovn	Willard	53-72	32	16	S-Auto	S-Auto	Throttle	425
B		1000	50	50	32	1	4	Ovn	3	G	Water	No	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	745
G		2000	100	100	32	1	4	Ovn	3	G	Water	No	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	
E		6000	300	300	110	1	4	Ovn	25	G	Water	No	Direct	Ovn	Willard	126	110	56	S-Auto	S-Auto	Throttle	
Mayhew, K-1	Mayhew Co., Milwaukee, Wis.	1000	12-58	12-58	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	475
K-2		1000	22-78	22-78	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	510
K-3		1000	30-97	30-97	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	120	32	16	S-Auto	S-Auto	Throttle	550
National, I-K	National Elec. Lighting Co., Wilton Junction, Ia.	1000	50	50	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	120	32	16	S-Auto	S-Auto	Throttle	550
I 1/2-K		1500	75	75	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	120	32	16	S-Auto	S-Auto	Throttle	550
Owen	R. M. Owen & Co., Chicago	1280	64	64	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	585
Perfection, SA-1	Perfection Storage Battery Co., Chicago	1200	50	50	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	575
SA-6		1200	50	50	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	650
SA-10		1200	50	50	32	1	4	Ovn	3	G	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	650
SAR-1		1500	70	70	32	1	4	Ovn	4	G-K	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	625
SAR-6		1500	70	70	32	1	4	Ovn	4	G-K	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	725
SAR-12		1500	70	70	32	1	4	Ovn	4	G-K	Water	Yes	Direct	Ovn	Willard	80	32	16	S-Auto	S-Auto	Throttle	1050

\*Without engine. Opt., Optional. S-Auto., Semi-Automatic. K, Kerosene. G, Gasoline. Electro-Mag., Electro-Magnetic. A-L, Auto-Lite. West., Westinghouse. R. & M., Robbins & Myers. † 8 hr. rating.



BUILDING GOOD WILL

(Concluded from Page 17)

When the names of the owners have been listed, an individually typewritten letter, similar to the one shown on this page, is sent to each owner, with an enclosure in some way dealing with the company's business. The company avoids any attempt, however, of using these letters in any way to directly solicit business.

On some days as many as fifty of these letters are mailed out, and Mr. Federspiel, President of the Southern Motor Co. says that the most pleasant part of the day's work is reading some of the letters of gratitude which are received in reply. Many persons who receive these letters come in person to express their thanks for the courtesy and to meet the people who go out of their way to perform a service of this nature.

The registration lists referred to are marked so that when any motorist has received one of the letters a check mark on the list prevents a second or third letter going to the same address.

Many instances of sales made more simple because of this inexpensive service, have been found by the Southern Motor Co., and the salesmen who turn in these names to the office need no urging to get them to do this now, because every one of them can point to cases where his work was facilitated by the warm reception he received when calling on some new prospect. In fact, the salesmen report that very often the prospect, upon hearing the name Southern Motor Co. replies, "Oh, yes; you are the people who send out those 'wobbly wheel' letters," and proceeds to warm up to the salesman as the representative of a company to which they are already kindly disposed.

The effort required to gain this sort of good will is small as compared with the very favorable result obtained, and dealers in other localities are urged to make use of the idea. There is no copyright on it.

## FINANCIAL AND INDUSTRIAL NOTES

General Motors Corporation has taken a five-year lease on the Waukesha Malleable Iron Foundry in Wisconsin, with an option to purchase in three or five years. The company has a capital stock of \$1,000,000 and employs 600 men. The product will be used chiefly in supplying the Samson Tractor Co.

Geiszler Storage Battery Co., of Hillsdale, Michigan, has elected officers as follows: President, J. B. F. Richards, of Chicago; vice-president and general manager, Martin Geiszler, of Cleveland; president, George N. Tubbs; secretary and sales manager, Fred L. Tubbs, Chicago; general superintendent, John Geiszler, formerly of Cleveland; production manager, A. Geiszler. The company expects to be in operation in thirty days.

Sterling Tire Corp. has declared a dividend of 1% per cent on the 7 per cent preferred stock, a dividend of two per cent on the series B preferred and a dividend of one per cent on common, all payable July 20.

Electric Storage Battery Co. stockholders have approved an increase in authorized capitalization from \$18,000,000 to \$30,000,000 preparatory to making a 20 per cent allotment available to subscriptions at par.

Stewart-Warner Speedometer Corp. net profits after allowing for depreciation and Federal taxes were \$579,304 for the three months ending March 3. The amount equals \$1.45 a share on the \$400,000 shares of common.

Motor Age Farm-Lighting Specification Tables																				
Name and Model	Water Capacity	No. 20 lamps	Lamp voltages	No. cyd's	No. cycles	Make of engine	Horsepower	Fuel	Cooling	Power pulley	Generator drive	Make of generator	Make of battery	Battery amp. hours	Battery volt	No. cells	Starting engine	Stopping engine	Governor type	Price
Montgomery Ward & Co, Chicago.																				
Powerlite, 163-L-66.	1000	50-85	32	1	4	Own	3	G & K	Water	Yes	Direct	Own	Own	80-120	32	16	Auto	Auto	Throttle	450
Powerlite, 163-L-72.	1000	50-120	32	4	4	Own	3	G & K	Water	Yes	Direct	Own	Own	180-240	32	16	Auto	Manual	Throttle	530
Powerlite, 163-B-81.	1000	50-85	32	4	4	Own	2 1/2	Any	Water	Yes	Belt	Imperial	Own	80-120	32	16	Auto	Manual	Throttle	263
Powerlite, 163-B-87.	1500	50-120	32	4	4	Own	3	Opt	Water	Yes	Belt	Imperial	Own	160-240	32	16	Auto	Manual	Throttle	343
Roberts-Hamilton Co., Minneapolis, Minn.																				
Robaco, Unit.	163-B-87.	75	32	1	4	Own	2 1/2	Any	Water	Yes	Direct	Imperial	Own	75-120	32	16	Auto	Manual	Throttle	625
Robaco, Unit.	163-B-87.	1500	32	1	4	Own	3	Opt	Water	Yes	Belt	Imperial	Own	75-120	32	16	Auto	Manual	Throttle	325
Robaco, Unit.	163-B-87.	1500	32	1	4	Own	3	Opt	Water	Yes	Belt	Imperial	Own	75-120	32	16	Auto	Manual	Throttle	425
Robaco, Unit.	163-B-87.	1500	32	1	4	Own	3	Opt	Water	Yes	Belt	Imperial	Own	75-120	32	16	Auto	Manual	Throttle	385
Sunbeam Electric Mfg. Co., Evansville, Ind.																				
B-2.	1500	75	110	1	4	Own	3 1/2	Opt	Water	No	Direct	Own	U. S. L.	75	110	14	Auto	S-Auto	Throttle	543
Sunbeam, Farm-Lite.	1250	75-150	32	2	4	Own	3 1/2	Opt	Water	No	Direct	Imperial	Phila.	95-295	32	16	S-Auto	Manual	Electro-mag.	50
Sunnyhome.	1000	50	30	4	4	Own	2 1/2	G & K	Water	Yes	Belt	Own	Opt.	88-210	32	32	S-Auto	Manual	Flyball	380
Swanlite.	2000	100	60	4	4	Own	5	G & K	Water	Yes	Belt	Own	Opt.	44-160	110	56	S-Auto	Manual	Flyball	495
Swartz, Unit.	2500	125	110	1	4	Own	3	G & K	Water	Yes	Direct	Own	Opt.	90-160	32	13	S-Auto	Throttle	Voltage	530
Swartz, E.	1000	62-70	32	1	4	Own	3	G & K	Water	No	Direct	Roth	Willard	60-75	32	16	S-Auto	Auto	Throttle	975
F. G.	1000	50	110	1	4	Own	3	G & K	Water	No	Direct	Own	Willard	120-165	32	16	S-Auto	Auto	Throttle	645
Beaudette & Graham Eng. Co., Boston, Mass.	500	17	32	1	4	Own	3	G & K	Water	No	Direct	Own	Willard	130	32	16	S-Auto	Auto	Throttle	760
Uni-Electric Corp., Detroit, Mich.	1000	75-120	32	4	4	Own	3	G & K	Water	No	Direct	Own	Willard	140	32	16	S-Auto	Auto	Throttle	645
Universal Products Co., Sandusky, Ohio.	1000	75-100	32	4	4	Own	3 1/4	K	Air	Yes	Direct	Own	Willard	180	32	16	S-Auto	Auto	Throttle	645
Universal, 1-KW.	4000	200	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	4000	75	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
Universal, 1-KW.	1500	100	32	4	4	Own	3 1/4	K	Air	No	Direct	Imperial	Willard	225	32	16	S-Auto.	Auto.	Throttle	760
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# From the Four Winds

## Glimpses at the World of Motordom

### Coming Motor Events

#### AUTOMOBILE SHOWS

Toronto, Exhibition City.....	National Automobile Show.....	Aug. 28, Sept. 11
Milwaukee.....	Annual Fall Automobile Show.....	Aug. 30-Sept. 4
Indianapolis.....	Fall Automobile Show.....	Sept. 6-11
Northampton, Mass.....	Annual Automobile Show.....	Oct. 6-8
Jersey City, N. J.....	Annual Automobile Show.....	Nov. 1-6
New York.....	Automobile Salon.....	Nov. 14-21
Chicago.....	Automotive Equipment Show.....	Nov. 15-20
New York.....	National Passenger Car Show.....	Jan. 8-15, 1921
Chicago.....	National Passenger Car Show.....	Jan. 20-Feb. 4, 1921

#### TRACTOR SHOWS

Holdrege, Neb.....	Third Annual Tractor Demonstration.....	Aug. 5-7
Los Angeles, Cal.....	National Tractor and Implement Show.....	Sept. 20-26
Columbus, O.....	Tractor Show.....	Feb. 6-12, 1921

#### FOREIGN SHOWS

Antwerp.....	Commercial Vehicles, Tractors, Trucks and Engines.....	June 26-July 25
London.....	Commercial Vehicles, Exhibition, Olympia.....	October
London.....	Passenger Car Show, Olympia.....	November

#### RACES

Watertown, N. Y.....	Dirt Track.....	July 24
Fulton, N. Y.....	Dirt Track.....	July 31
Paris, France.....	Grand Prix Race, Sporting Commission.....	August
Erie, Pa.....	Dirt Track.....	Aug. 7
Buffalo, N. Y.....	Dirt Track.....	Aug. 14
Elgin, Ill.....	Road Race.....	Aug. 14
Johnstown City, Pa.....	Dirt Track.....	Aug. 21
Middletown, N. Y.....	Dirt Track.....	Aug. 20-21
Flemington, N. J.....	Dirt Track.....	Aug. 27-28
Canandigua, N. Y.....	Dirt Track.....	Aug. 28
Hornell, N. Y.....	Dirt Track.....	Sept. 6
Uniontown, Pa.....	Speedway Race.....	Sept. 6
Syracuse, N. Y.....	Dirt Track.....	Sept. 17-18
Allentown, Pa.....	Dirt Track.....	Sept. 25

#### TOURS

Milwaukee, Wis.....	Annual Fall Automobile Show.....	Aug. 30-Sept. 4
Detroit.....	Good Roads Assn. Tour.....	July 14-20

**Iowa Registration Increasing**—Motor car registration in Iowa up to July 1 was 403,755. This exceeds the 1919 registration by nearly 40,000 cars and it is estimated there are at least 15,000 cars delinquent. The receipts from motor car licenses this year total \$6,523,210, as against \$3,077,445 for 1919.

**Pontiac Labor Wages**—According to figures from the State Labor Board, Pontiac leads the cities of the state, outside of Detroit, in the average wages paid to industrial employees. A total of 9953 employees receive an average of \$5.16 daily. Flint comes next with an average of \$5.00 paid to 29,715 employees. During the last year Pontiac added 43.9 per cent to its employed population, 74.6 per cent of which was skilled labor at an average of \$7.65.

**Missouri License Figures**—James J. O'Connor, superintendent of the Missouri State automobile department, shows in his annual report that the automobile owners of Missouri have contributed \$1,937,159.30 to the good roads fund in the past year. Licenses were issued for 263,576 cars and trucks and 3,387 motorcycles and to 2,419 dealers. The total number of licenses issued this

year will probably exceed three hundred thousand. There are 22,188 licensed chauffeurs.

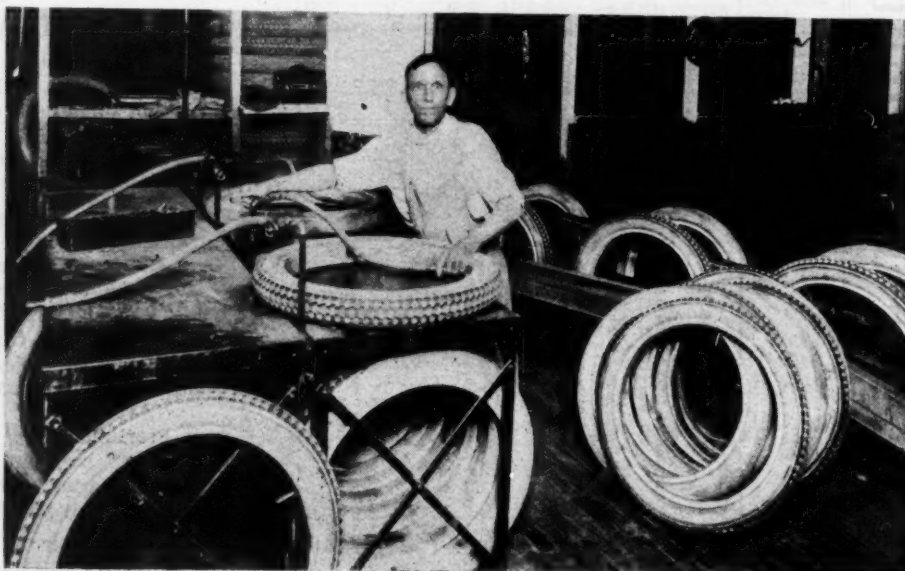
**New York Shows Car Gain**—Reports of the state automobile bureau for the six months ending July 1 show a big increase in the number of automobiles registered in the three bureaus of the state. The number registered in 1919 and the number at the end of June by bureaus is:

	1919	1920
New York.....	165,037	197,426
Buffalo.....	152,316	169,938
Albany.....	127,782	148,203

**Veterinarians Passing Out**—Due to the passing of the horse there are only six candidates for registration as veterinarians taking the Massachusetts examination this year.

**Massachusetts Registration Data**—A gain of more than 100 per cent in the number of passenger cars registered this year against the corresponding July 1, 1917, and a 26 per cent gain over July 1, 1918, is shown in the figures, 206,094 registered in Massachusetts by July 1.

The 1918-19 total of motor trucks is 45,710. In addition, 11,883 motorcycles have been registered so far this year. Certificates have been issued to 1,885 manufacturers or dealers, 53,437 new operators' licenses have been issued and 143,755 such licenses renewed.



TESTING TIRES BY TUNE

The world has had for years its wine, tea and coffee tasters, experts who by simply sipping the various beverages are able to tell the value of each particular brand. Now the automobile industry has developed a new expert. Frank McIntuff is the first "tire tuner" in the country. His touch is so sensitive that he needs no gages to indicate when the proper amount of air has been fed into the tire from the compressed air tanks. McIntuff judges the amount of air in a tire by striking it with his hand, if it gives forth a certain musical note it is passed.